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THE TORTOISE BEETLES OF CHINA (CHRYSOMELIDAE: CASSIDINAE)*

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Introduction

The tortoise beetles or gold beetles represent the subfamily Cassidinae of the large family Chrysomelidae (leaf or plant beetles) of the order Coleoptera. They are almost world-wide in distribution, though they have developed a much greater variety of types in the tropics, particularly tropical South America. They are scarce in certain temperate regions, particularly temperate North America and temperate Australia, though they are abundant in Europe and temperate Asia.

The Cassidinae are without exception leaf-feeding insects, both in the larval and adult stages. Moreover, they feed entirely on the surfaces of leaves, never mining between the outer leaf layers as do some of their relatives.

The subfamily is known for two characteristics in particular. One of these characteristics which is peculiar to the group is the possession in the larval stage (generally retained in the pupal stage) of a caudal appendage to which is attached the successive molted skins of the larva, and in turn, generally, accumulated larval feces. This structure, called the "parasol,"

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apparently serves as a protective device for the slow-moving, free-living larvae, and also for the sessile, likewise exposed, pupae, both by helping to hide and to arm these stages. The other particularly noteworthy characteristic, one almost limited to this group among all insects and present in most of the members of the subfamily, is a beautiful iridescence which is generally brilliant golden although it often includes other shades. This iridescence is present in life but lost in death. The possession of this characteristic is responsible for many of these beetles being classed among the most beautiful of living insects.

Scope: This study particularly concerns the Cassidinae inhabiting China and the adjacent islands. The purely taxonomic portion deals with the species of the subfamily thus far known from greater China, including Sinkiang, Mongolia, Tibet, Tsinghai, Manchuria, Hainan Island, and Taiwan, and also those known from the Ryukyu Islands, Korea, Japan, and Sachalin, since all of these areas are intimately related zoogeographically. The discussion of phylogeny, host-plant relationships, and distribution concerns the entire world.

Materials and methods: Collecting of adult specimens, and of some larval material, was done between 1929 and 1951 (Gressitt, 1936, 1937, 1940) in most of the areas treated in the taxonomic portion other than Sachalin, Korea, Manchuria, North China, and central Asia. Life-history work was done in Canton and Hong Kong between 1939 and 1942. The biological study concerned five species of three genera (four subgenera). Specimens have been studied from the collections of the following institutions: Lingnan Natural History Museum, California Academy of Sciences, United States National Museum, American Museum of Natural History, Museum of Comparative Zoology, Musée Heude of the Université l'Aurore in Shanghai, University of Nanking College of Agriculture, West China Union University, University of Amoy, Taiwan Agriculture Research Institute, Hong Kong University. Reports on some of the specimens collected have already been published (Gressitt, 1938 a-c; 1939; 1942). About 3,000 specimens have been studied, not counting many of those reared.

Types designated in the text as in the Lingnan Natural History Museum are temporarily on loan deposit in the California Academy of Sciences in San Francisco.

The life-history studies were made by rearing the beetles in petri dishes, small rearing cages, and glass jars with perforated aluminum covers. Leaves for food were added once or twice daily and kept fresh by means of small bits of wet cotton applied to the cut tips of the petioles. Most of the rearing was carried on in the insectary of the Lingnan Natural History Survey and Museum at Canton, although some was done on open porches in Canton and Hong Kong, all under reasonably normal conditions.

In the taxonomic treatment of the Chinese fauna, the higher categories are arranged systematically. The genera are first keyed, and under each generic heading is presented a key to the species or subgenera, together with the important generic characters. The species are arranged alphabetically under each genus.

Superscript numbers in the synonymy refer to geographical or host plant records listed under the pertinent headings below for the same species.

Romanizations of localities are often based on the pronunciation of the place-names in the dominant dialect of the particular region concerned, whereas romanizations of districts and provinces are according to the Mandarin pronunciation (Chinese official system).

Explanation of Special Anatomical Terms

Basal triangle: The basal area of each elytron bounded by a ridge from the suture behind the scutellum toward the basal margin between scutellum and humeral callus, generally an oblique extension of the second interpunctural area parallel to the suture.

Caudal furca (caudal process, feces fork): The forked terminal process of the abdomen of larva to which are attached the exuviae of the preceding instars.

Explanate margin: The frequently very broadly expanded margins of the pronotum, or of the elytra in adult beetles.

Frontoclypeal area: The main portion of the front of the head, bounded by the eyes, labrum, and antennal insertions.

Humeral angle (humerus): The basal and outer angle of the anterior portion of the explanate margin of an elytron.

Humeral callus: The swelling on the outer portion of the base of an elytron; located above the attachment of the hind wing.

Interpunctural areas (interspaces): The interspaces between the puncture-rows on the elytral discs. They are counted from the suture outward to the explanate margin.

Parasol: The combination of feces and larval exuviae, or the latter alone, attached to the caudal furca and held over the body.

Posterolateral portion or angle: The portion of an elytral explanate margin more or less half way between the middle of the side of the beetle and the sutural angles, or a more strongly curved portion in that area.

Puncture-rows: The longitudinal rows of punctures on the elytral discs counted from the suture outward.

Tarsal claws toothed: The tarsal claws are considered to be toothed when there is a more or less tooth-like process arising from the basal portion of each, not merely a slight swelling at the point of union and attachment of the two claws of each tarsus.

Explanation of Geographical Terms

Greater China: All of China, including Manchuria, Mongolia, Sinkiang (Chinese Turkestan), Tsinghai, Tibet, Hainan Island, and Taiwan.

Japan: The islands of Hokkaido, Honshu, Kyushu, and Shikoku.

Ryukyu Islands (Loochoo, Riukiu, Liu-kiu): The chain of islands between Japan and Taiwan, including Tanegashima, Yakushima, Amami-Oshima, Okinawa, Miyako, Ishigaki (Yaeyama), Iriomote, and Yonakuni, the last four forming the Sakishima group.

South China: The mainland portion of China south of the Yangtze River, including much of the headwater area of the latter; specifically, the southern portions of Kiangsu, Anhwei, and Hupeh provinces, and all of the provinces of Chekiang, Fukien, Kiangsi, Kwangsi, Hunan, Kweichew, Yunnan, Szechuan, Sikang, and mainland Kwangtung; this including West China and Southeast China.

Southeast China: The provinces of Chekiang, Fukien, Kiangsi, and Hunan, mainland Kwangtung, eastern Kwangsi, and the southern portions of Kiangsu and Anhwei.

North China: The portion of China proper north of the Yangtze River plus Manchuria, specifically the northern portions of Kiangsu, Anhwei, and Hupeh provinces, all of Manchuria, and the provinces of Shantung, Hopei, Honan, Shensi, and the southeastern portion of Kansu, and southern Inner Mongolia (Chahar, Suiyuan, and Ninghsia).

Central Asia: Outer Mongolia; the northwestern portions of Chahar, Suiyuan, Ninghsia, and Kansu; Tsinghai; Sinkiang (Chinese Turkestan); and northern Tibet (exclusive of Sikang).

West China: The provinces of Sikang, Szechuan, Yunnan, and Kweichow, and western Kwangsi.

List of Abbreviations

A.M.N.H.—The American Museum of Natural History, New York City.

C.A.S.—The California Academy of Sciences, San Francisco.

HKU.—The University, Hong Kong.

Lingnan—The Lingnan Natural History Museum, Lingnan University, Canton, China.

M.C.Z.—The Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts.

Heude—Musée Heude, Université l'Aurore, Shanghai, China.

U.NK.—The University of Nanking (College of Agriculture).

U.S.N.M.—The United States National Museum, Washington, D. C.

W.C.U.U.—West China Union University (Biology Department), Chengtu, Szechuan, China.

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History

The family Chrysomelidae has had several great monographers, among them T. Lacordaire, F. Chapuis, and J. S. Baly. The most comprehensive work on the subfamily Cassidinae was done by C. H. Boheman (1854–1862). The most extensive worker in the group in recent years has been Franz Spaeth, who published the synopsis of Palearctic species (1926) in collaboration with Edmund Reitter. The only major work on Oriental species appeared in the Fauna of British India (Maulik, 1919).

Very little comprehensive work has been done on the tortoise beetles of China. Most of the species were described in scattered papers, nearly all by Europeans, particularly Boheman, Spaeth, Weise, and Baly, and many of them were originally described from areas apart from China, such as Siberia, Japan, India, or the peninsula of southeastern Asia. About 52 species were listed from China in two recent catalogs (Liu, 1936, and Wu, 1937), but these actually included only about one-half of the 91 species treated here, as a few of the former were based on erroneous records and a few were from the farthest borders of Chinese Turkestan and are omitted in this work. Since that time additional species have been recorded or described (Spaeth, 1936, 1938; Gressitt, 1938, 1939, 1942), and more are added herein.

Systematics

The place of the Chrysomelidae in the Coleoptera: The family Chrysomelidae, in the broad sense, is one of the largest families of insects, being third in size within the order Coleoptera and including over 24,000 named species. The family is closely related to the large family Cerambycidae. These two families, together with the relatively small family Lariidae (Bruchidae; pea weevils), form the suborder Phytophaga or superfamily Cerambycoidea. This superfamily is placed highest among the beetles proper, before the suborder Rhynchophora, or weevils. One of the characters uniting these three families is the reduced fourth tarsal segment, which is visible only with high magnification in smaller species. Furthermore, the antennae are generally simple and slender, never clavate, lamellate, or geniculate,

and the species are all phytophagous, feeding on leaves, stems, or wood of growing plants or in seeds or dead wood. The Lariidae are seed eaters, the Chrysomelidae are almost entirely leaf eaters, with some stem-boring or root-feeding forms, and the Cerambycidae are almost entirely wood borers.

The Chrysomelidae are generally distinguished from the Cerambycidae by their leaf-feeding, instead of wood-boring habits, their shorter and often dorso-ventrally compressed bodies, and in having the antennae rather flexible and generally shorter, instead of longer than the body. The Bruchidae are easily distinguished from the Chrysomelidae and the Cerambycidae by their very short, stumpy body, somewhat snoutlike head and beady or pectinate antennae.

The place of the Cassidinae in the Chrysomelidae: The Cassidinae form one of the largest subfamilies of the family Chrysomelidae, numbering over 3,000 named species. The subfamily is placed at the top of the scale within the family, as representing its peak of specialization. Chrysomelidae has been divided by various workers into several subdivisions, which by some are given family rank. Others have accorded each of the 16 subfamilies the rank of family. I believe that the whole should be retained as a single family, divided into six (or seven) subdivisions of a category intermediate between family and subfamily, as follows:

Group I: Orsodacninae, Sagrinae, Donaciinae, Criocerinae, Megascelinae, Megalopodinae.

Group II: Clytrinae, Cryptocephalinae, Chlamisinae.

Group III: Lamprosominae, Eumolpinae.

Group IV: Chrysomelinae.

Group V: Galerucinae, Halticinae.

Group VI: Hispinae, Cassidinae.

Chen (1940) made six families, taking the Criocerinae out of the first group to stand alone, and transferring the Lamprosominae from one group to go with the Clytrinae, Cryptocephalinae, and Chlamydinae. Both Chen and I (Gressitt, 1942) independently removed the Megalopodinae from the second group to my first group, and I set the subfamily Chrysomelinae to stand alone as a group. I further believe that the Orsodacninae may prove to represent a group apart from the first group.

Following is presented a key to the subfamilies of Chrysomelidae of the world. One of these subfamilies, Megascelinae, is not represented in the Old World. From the key it will be seen that the Cassidinae together with the Hispinae form a group widely separated by fundamental characters from the rest of the subfamilies. This suggests that they may have been the earliest group to diverge from the parent stock and continue to this day. Their divergence may have taken place at the beginning of the Triassic, or even

in the Permian, since the Chrysomelidae and Cerambycidae are supposed to have separated or originated in the Carboniferous. The two subfamilies, though together widely separated from the rest of the Chrysomelidae, are not entirely suited to a distinct separation, at least on adult characters, and the larval habits and structures must be taken into account. The Neotropical genus *Himatidium* has been shuttled between the two.

KEY TO THE SUBFAMILIES OF CHRYSOMELIDAE

1. Head with vertex projecting strongly forward and mouth directed posteriorly below and often partly hidden by prosternum; prothorax margined laterally; larvae dorso-ventrally flattened 2

— Head normal, with vertex not projecting forward and with mouth directed forward and downward 3

2.(1) Pronotum and elytra with broad marginal expansions, the former often covering head; larvae surface-feeders, bearing caudal appendages..... *Cassidinae*

— Pronotum and elytra rarely with broad marginal expansions, but often with spines; body generally slender if spineless; head never covered by pronotum; larvae generally leaf-miners, lacking caudal appendages..... *Hispinae*

3.(1) Antennae closely inserted on front of head; elytra not very rigid; anterior coxae contiguous, prominent; prothorax margined laterally; larvae free-living, root-feeding or leaf-mining, more or less cylindrical..... 4

— Antennae not very closely inserted, separated by frons or vertex; elytra generally somewhat rigid; only in the Clytrinae and a few Eumolpinae and Orsodacninae are both the anterior coxae contiguous and the prothorax margined laterally 5

4.(3) Posterior femora not greatly enlarged..... *Galerucinae*

— Posterior femora greatly enlarged for jumping..... *Halticinae*

5.(3) Eyes prominent and head more or less strongly constricted behind them; anterior coxae prominent and close, or fairly close; prothorax not completely margined laterally 6

— Eyes generally not very prominent and head not strongly constricted behind them; anterior coxae (except in Clytrinae) not close and not very prominent; prothorax usually completely margined laterally..... 11

6.(5) Posterior femora large and strongly swollen, often armed with teeth.... 7

— Posterior femora generally not greatly enlarged, rarely armed with teeth; exceptions have antennae not very widely separated..... 8

7.(6) Antennae long, with most segments longer than broad and cylindrical or bead-like; middle three abdominal segments no shorter than others; larvae bore in woody stems of leguminous vines..... *Sagrinae*

— Antennae short, barely reaching beyond humeri, distal segments generally broader than long, more or less dentate; middle three abdominal segments somewhat shorter than others..... *Megalopodinae*

8.(6) Antennal insertions separated by width of frons, fairly distant..... 9

— Antennal insertions not separated by width of frons, relatively close; antennae very slender; larvae generally live in stems of aquatic plants..... *Donaciinae*

9.(8) Tarsal claws simple, not toothed; prothorax cylindrical, never toothed laterally 10

— Tarsal claws generally bifid or toothed internally; prothorax frequently toothed or tuberculate laterally; larvae leaf-mining..... *Orsodacninae*

10.(9) Prothorax stout and often constricted near middle; head strongly narrowed behind eyes; deep oblique grooves meeting on vertex; antennae fairly stout; larvae free or stem-boring, bearing feces..... *Criocerinae*

— Prothorax slender, cylindrical, much narrower than elytra; head hardly narrowed behind eyes; no deep oblique grooves on vertex; antennae very slender; anterior coxae slightly separated; Neotropical, north to Texas..... *Megascelinae*

11.(5) Middle three abdominal sternites constricted in central portions; form of body subcylindrical; larvae case-bearers..... 12

— Middle three abdominal sternites not constricted; form of body more or less ovate or rounded, often strongly convex and constricted anteriorly..... 14

12.(11) Antennae relatively short and serrate; anterior coxae close and prominent, or antennae lodged in grooves in pro-pleura..... 13

— Antennae long and slender, not serrate and not lying in grooves; anterior coxae widely separated and not prominent..... *Cryptocephalinae*

13.(12) Prothoracic pleura without antennal grooves; body surfaces smooth; anterior coxae contiguous, prominent; larvae often in ant nests..... *Clytrinae*

— Prothoracic pleura with grooves for reception of antennae; body surfaces very rough or tuberculate..... *Chlamisinae*

14.(11) Wing venation not reduced; cubital veins present; clypeus not divided into two parts; body cylindrical, subspherical or deeper than wide..... 15

— Wing venation greatly reduced: cubital veins lacking; clypeus divided into two parts; body generally elongate-oval in dorsal outline and elliptical or semicircular in transverse section; larvae free-living, bearing feces..... *Chrysomelinae*

15.(14) Prothorax as broad as elytra basally, its sides grooved for reception of antennae; abdomen grooved for reception of hind legs; larvae are case-bearers ..... *Lamprosominae*

— Prothorax generally narrower than elytra basally, its sides not grooved for reception of antennae; abdomen not grooved for reception of hind legs; larvae are root- and leaf-feeders, not case-bearers..... *Eumolpinae*

Taxonomy of the Cassidinae

The taxonomy of the tortoise beetles is difficult as compared with that of many other groups of beetles. Variation within a species is rather great, and reliable constant characters are rather few. One of the most obvious stumbling blocks for workers in this group is associated with the peculiar nature of coloration in these beetles. The color, as mentioned above, is

generally of an ephemeral nature. It is the result of a combination of structural and functional effects, involving both reflection of light rays from numerous semitransparent or completely transparent layers in the cuticle, and the presence of body fluid between the minute layers (Mason, 1929; Onslow, 1921). This fluid requirement is lost with desiccation following death and the iridescence disappears. Variation in color occurs even in life because these beetles have the ability to change the degree of brilliancy of the iridescence by widening or narrowing the separation of the layers of cuticle, accomplished by added or lessened pressure of fluid in the epidermal region. In many types, by soaking dried specimens in water or even in alcohol in some cases, the original golden iridescence can be re-attained to a greater or lesser degree, but only to be lost again with re-desiccation. Apparently both differences in method of killing and preserving and rate or extent of desiccation of specimens are responsible for great differences which so frequently exist between dried specimens of a species taken at the same time and place. These differences involve the range from complete transparency to complete opacity of the cuticle and seem to suggest great differences in precipitation of solid material from the body fluid between the layers of the cuticle. These variations are no doubt dependent at least in part on the physiological state at the time of death, particularly as regards amount of fatty tissue present.

Permanent pigmentation, such as black markings, generally occurs among the outermost layers of the cuticle, whereas the clouding effect of the above-mentioned precipitation often occurs farther from the surface of the cuticle. The variation in degree of precipitation, besides changing the general appearance and color of the insect, further aids confusion in taxonomy by causing punctures to appear much larger or smaller than they actually are, and ridges or borders to appear higher, lower, thinner, or thicker than is actually the case. When opacity is complete, punctures appear much smaller than they do when the cuticle is transparent.

In the explanate margins partial precipitation of opaque material within almost invariably produces a reticulated effect of opaque lines, varying in every degree of thickness from practical invisibility to complete opacity except for minute transparent punctures, and further to the complete extremes mentioned above. When the margins are punctured, the reticulations form around the punctures. The effect on the pronotal and elytral discs is similar, but less conspicuous. From these remarks it will be seen that "explanate margins reticulate," or similar statements, are worthless as far as classification is concerned.

In addition to the type of color mentioned above, some cassidids have permanent metallic and iridescent coloration of the strictly structural type, which remains unchanged in death. Some are partially permanently metallic

and partially endowed with ephemeral colors, that is on different parts of the body.

Secondary sexual dimorphism occurs in the cassidids, but is more pronounced in the more primitive groups and rather slight in the more advanced types. It generally involves differences in the length and thickness of the antennae, and the shape of the pronotal and elytral explanate margins.

Wing venation as a taxonomic character is not of great use within the subfamily, and the same is true of genitalic morphology.

The Chinese Cassidinae

I have assigned the known Chinese tortoise beetles to 93 forms, belonging to 91 species, arranged in 15 genera of 3 tribes. Nine species and two subspecies are herein described as new to science. One new subgenus is also proposed. Three older generic names are substituted for those hitherto commonly used, and two of these involve changing the tribal or subtribal names concerned. Another genus is reduced to synonymy, and a number of new subgeneric assignments are made. Thus nearly one-half of the species discussed are given newly arranged names, at least in the subgeneric sense.

I believe that the following names, as recorded from China, or Japan, are either misidentifications or are based on mistaken locality labels associated with the specimens:

Prioptera pallida Wagener, Spaeth.
Glyphocassis trilineata (Hope), Liu.
Chirida promiscua (Boheman), Spaeth.
Metriona versicularis (Thunberg).

The following species have been recorded from the far borders of China, and are not discussed in this work:

Cassida moori Boheman; "Turkestan."

Cassida nigriventris Boheman; "Tibet"—probably the Brahmaputra River valley in southernmost Tibet.

Cassida turcmenica Weise; Dsungarei (northwestern Sinkiang).

Cassida undecimnotata Gebler; Tian Shan (Tien Shan, northwestern Sinkiang).

The Chinese record of *Cassida catenata* (Boheman) is referred to under *Cassida circumdata* Herbst, below.

Cassida (Cassidula) nobilis Linnaeus and *C. (C'la) vittata* Villers were recorded from Japan (Chujo, 1934) on the basis of interpreting the German abbreviation for "excluding" Japan, as including it, in the distribution recorded in the Coleopterorum Catalogus (Spaeth, 1914-c). However, the latter species was cited from Kyoto, Japan, in another work (Spaeth, 1914-d).

Synoptic Discussion of Genera and Species

Key to the Genera of Chinese Cassidinae

1. Head visible from above, not covered by pronotum *(Basiprionotini)* 2
— Head not visible from above, covered by pronotum 7

2.(1) Vertex not produced anteriorly; elytral margins narrow at bases; pronotum grooved laterally 3
— Vertex strongly produced into a forward projecting plate above antennal insertions; pronotum very broad, lacking submarginal grooves..*Notosacantha*

3.(2) Pronotal and elytral margins broadly or moderately expanded; anterior margin of pronotum deeply and arcuately or very broadly emarginate; elytra non-metallic, in large part shallowly and irregularly punctured 4
— Pronotal and elytral margins narrowly expanded; anterior margin of pronotum feebly emarginate; elytra metallic or partly so, very deeply and subseriately punctured 5

4.(3) Pronotal and elytral margins quite broad, latter widened in middle; prothoracic margins deeply emarginate anteriorly, borders not particularly thickened ..... *Basiprionota*
— Pronotal and elytral margins not very broad, latter hardly widened in middle; prothoracic margins broadly and shallowly emarginate apically, borders thickened ..... *Stenoprioptera*

5.(3) Body oblong-ovate 6
— Body strongly broadened and rounded posteriorly; scutellum triangular..... *Megapyga*

6.(5) Pronotum grooved medially and nearly impunctate, its anterior margin obtusely emarginate; elytra entirely metallic, iridescent..... *Craspedonta*
— Pronotum coarsely punctured, not grooved medially, its anterior margin broadly and transversely emarginate; elytra only partially metallic..... *Epistictia*

7.(1) Tarsal claws bearing a comblike structure at base *(Aspidomorphini)*.... 8
— Tarsal claws lacking a comblike structure at base *(Cassidini)*..... 11

8.(7) Comblike structure present on both sides of tarsal claws..... 9
— Comblike structure present on inner side of tarsal claws only..... *Sindia*

9.(8) Body somewhat triangular or pentagonal in outline, fairly deep; elytra rugulose and deeply punctured, with moderately broad, declivitous lateral expansions 10
— Body rounded in outline, depressed; elytra fairly smooth, with broad, subhorizontal lateral expansions ..... *Aspidomorpha*

10.(9) Comblike structures long on both sides of tarsal claws..... *Sindiola*
— Comblike structures short on outer sides of tarsal claws..... *Laccoptera*

11.(7) Prosternum lacking a groove on each side for reception of antennae..... 12
— Prosternum with a groove on each side for reception of at least basal portions of antennae 13

12.(11) Apical margins of elytra lacking a row of fine hairs on undersides; claws often toothed basally ..... *Cassida*

— Apical margins of elytra with a row of fine hairs on undersides; tarsal claws lacking basal teeth or appendices ..... *Thlaspida*

13.(11) Tarsal claws not appendiculate basally, or feebly so 14

— Tarsal claws strongly appendiculate basally; last two antennal segments projecting beyond posterior margin of prothorax; antennae slender; body very deep ..... *Chiridopsis*

14.(13) Antennae hardly reaching beyond posterior margin of prothorax 15

— Antennae with distal two or three segments extending beyond posterior margin of prothorax; second and third segments subequal in length; pronotum transversely elliptical; explanate margins of elytra not very steeply declivitous; body moderately convex ..... *Glyphocassis*

15.(14) Third antennal segment shorter than second; body deep; pronotum triangular; explanate margins of elytra steeply declivitous ..... *Ischyronota*

— Third antennal segment as long as second; elytra each with four longitudinal ridges (not yet recorded from China) ..... **Hypocassida*

Tribe **BASIPRIONOTINI**, new name

Priopterini of authors.

Pronotum emarginate anteriorly, exposing at least part of head. Antennae fairly stout.

Subtribe **NOTOSACANTHINA**

Hoplionotites LACORDAIRE, 1875, Gen. Col., 11:357.

Head produced anteriorly above antennal insertions. Antennae slender basally and thickened distally into a slender club.

Genus **Notosacantha** Chevrolat

Notosacantha CHEVROLAT, 1837, in Dejean, Cat. Col., ed. 3:367, 391; BARBER & BRIDWELL, 1940, Bull. Brookl. Ent. Soc., 35:7.

Hoplionota HOPE, 1840, Col. Man., 3:153; GUERIN, 1844, Icon. Regne Anim. Ins., 2:287; BOHEMAN, 1850, Mon. Cassid., 1:16; CHAPUIS, 1875, Gen. Col., 9:357; WAGENER, 1881, Mitt. Münch. Ent. Ver., 5:21; SPAETH, 1913, Verh. Zool.-Bot. Ges. Wien, 63:381; 1914, op. cit., 64:290; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 284.

Head produced anteriorly between eyes into a more or less flat or concave plate, extending well beyond eyes and often broadened distally. Frons longer than broad, concave. Antennae very slender basally, thickened in distal portion. Pronotum generally more than twice as broad as long, deeply emarginate at middle of anterior portion, exposing most of dorsal surface of head to view from above. Elytra about as broad as pronotum, often somewhat rectangular, generally rough and tuberculate on discs. Explanate margins of pronotum and elytra broad, deeply punctured. Legs short and

flattened; tarsi short and broad, hairs of third segment extending far beyond claws. This genus contains nearly 200 species, almost one-half of them from Madagascar, and the rest largely from South Africa and the Oriental region.

Generotype: *Cassida echinata* Fabricius (Madagascar).

Range: Ethiopian, Oriental, and Australian regions.

KEY TO THE CHINESE SPECIES OF NOTOSACANTHA

1. Anterior process of head narrowed distally or nearly obsolete 2
— Anterior process of head broadest near apex, truncate or convex apically 4

2.(1) Anterior process of head distinct, narrowed distally, cleft in middle 3
— Anterior process of head nearly obsolete, blunt and not flattened, feebly cleft at middle of apex; elytral ridges and tubercles very high; anterior inner tubercle laterally compressed and posterior tubercle acute ..... *N. castanea*

3.(2) Body subrounded, brown, with a broad "window" at middle of each side; pronotal margin even anteriorly ..... *N. fumida*
— Body suboblong, black, with a narrow "window" at middle of each side; pronotal margin subserrate anteriorly ..... *N. sinica*

4.(1) Body outline suboblong; prothorax practically as broad as widest part of elytra 5
— Body outline subrounded; prothorax distinctly narrower than widest portion of elytra; punctures of pronotal expansions elliptical or round 7

5.(4) Prothorax about three times as broad as long; punctures on explanate margins of pronotum not all oblong in shape; each elytron with a "window spot" 6
— Prothorax barely more than twice as broad as long; punctures on explanate margins of pronotum oblong; each elytron with a longitudinal ridge parallel to suture, with a few short branches, but lacking tubercles and lateral "window spots" ..... *N. oblongopunctata*

6.(5) Each elytral disc with many small tubercles or nodes ..... *N. centinodia*
— Each elytral disc with three sharp major tubercles connected by some distinctly raised reticulate ridges ..... *N. trituberculata*

7.(4) Anterior process of head somewhat rounded apically, feebly cleft at middle 8
— Anterior process of head truncate apically, emarginate at middle; pronotal and elytral margins testaceous ..... *N. marginalis*

8.(7) Disc of each elytron with a few small tubercles and a median longitudinal ridge posteriorly ..... *N. arisana*
— Disc of each elytron with three low tubercles and two ridges on posterior portion which meet to form a right angle ..... *N. sauteri*

Notosacantha arisana (Chujo), new combination

Hoplionota arisana CHUJO, 1934, Sylvia, 5:148[1]. (Type in Taiwan Agricultural Research Institute.)

Dorsal surfaces dark reddish brown; explanate margins paler, those of elytra each with a pale yellowish spot before middle; head, thoracic sterna, and legs red-brown; abdomen yellow-brown; antennae brownish basally, duller distally.

Dorsal outline subrounded; moderately convex. Head with anterior process broadened distally, with apical margin convex and briefly cleft at middle. Pronotum two and one-half times as broad as long, granulose; disc with two depressions and two oblique grooves; explanate margins with fairly large transparent punctures. Elytra barely broader than prothorax basally, much wider in middle; disc of each with small scattered tubercles and a submedian carina behind center; suture raised beyond a fovea on each behind scutellum. Length 5 mm.; breadth 4 mm.

China: Taiwan (Arisan[1]).

Distribution: Taiwan.

Notosacantha castanea (Spaeth), new combination

Hoplionota castanea SPAETH, 1913, Verh. Zool.-Bot. Ges. Wien, 63:507[1]; 1933, Wiener Ent. Ztg., 50:126[2]. (Type in Spaeth collection.)

Dorsal surfaces castaneous brown, slightly darker along suture; window-spot of each elytral margin brighter, feebly transparent; ventral surfaces reddish yellow. Head with anterior process narrowed before eyes, acute apically; pronotum two and one-half times as broad as long, narrowed at sides toward basal angles, smooth and shiny on disc, with a broad, punctate basal impression and an incomplete median transverse impression, and punctured on margins; elytra slightly longer than broad, subtruncate apically, coarsely seriate-punctate on discs which bear several irregular ridges and fairly sharp tubercles, coarsely punctured on explanate margins. Length 5.5 mm.; breadth 4.8 mm.

China: Taiwan[2].

Distribution: North Indo-China[1]; Taiwan.

Notosacantha centinodia (Spaeth), new combination

Hoplionota centinodia SPAETH, 1913, Verh. Zool.-Bot. Ges. Wien, 63:514[1]; 1933, Wiener Ent. Ztg., 50:128 (synopsis). (Type in Spaeth collection.)

Head and antennae yellow; pronotum pitchy black with yellow spots near head and basal margin partly brown; scutellum black; elytra brown, a bright pale spot on each humerus, a yellowish-white window-spot on each explanate margin, tubercles black and suture and extreme apices yellow; ventral surfaces reddish yellow with metasternum black.

Dorsal outline subrectangular; feebly constricted between pronotum and elytra. Head with interocular process short, feebly broadened distally,

truncate and narrowly emarginate apically. Pronotum three times as broad as long, narrowed to posterolateral angles, finely punctured on depressed areas of disc. Elytra broadest anterior to middle, feebly narrowed posteriorly, as long as broad; disc of each with many small tubercles, principal posterior one not very high; explanate margins rugulose punctate except on window-spot. Length 4.5 mm.; breadth 3.8 mm.

China: Yunnan[1].

Distribution: Southwestern China.

Notosacantha fumida (Spaeth), new combination

(Plate 27, figure 2)

Hoplionota fumida SPAETH, 1913, Verh. Zool.-Bot. Ges. Wien, 63:513[1]; 1933, Wiener Ent. Ztg., 50:131; GRESSITT, 1938, Lingnan Sc. Jl., 17:573[2]. (Type in the British Museum.)

Pitchy black to reddish brown above; explanate margins narrowly ochraceous at borders, that of each elytron with a large pale yellow translucent spot anterior to middle; ventral surfaces pitchy with abdomen and legs dull testaceous.

Rounded-oblong in dorsal outline; nearly as broad as long; dorsum relatively even. Cephalic process narrowed apically, deeply and narrowly emarginate. Pronotum impressed with elongate punctures at sides, convex and sparsely punctured in middle; scutellum broad, rounded posteriorly; elytra incomplete, feebly raised at three points, with four ridges radiating from third tubercle; explanate margins more strongly punctured, but impunctate on inner halves of translucent areas. Length 5–6.5 mm.; breadth 4.2–5.4 mm.

China: N. Kwangtung[2] (Yao Shan, Lien Distr.); Hong Kong (?).

Distribution: South China[1].

Notosacantha marginalis (Gressitt), new combination

(Plate 27, figure 1)

Hoplionota marginalis GRESSITT, 1942, Lingnan Nat. Hist. Surv. & Mus. Spec. Publ., 5:1, fig. 1[1]. (Type in Lingnan Museum.)

Dorsal surfaces dull red-brown to pitchy on pronotal and elytral discs and scutellum, paler pinkish red on lateral expansions with extreme margins testaceous; ventral surfaces pitchy brown, black on meso- and metasterna; antennae reddish ochraceous, golden pubescence on clubs.

Head with interocular process concave, slightly broader apically than basally, emarginate in middle and rounded at corners; antenna with last five segments broadened and compressed; scape longer than following two segments united. Prothorax two and one-half times as broad as long; basal

margins evenly rounded; anterior emargination trapezoidal; disc unevenly convex, slightly raised posteriorly along middle, opaque, almost granulose at sides; explanate margins somewhat shiny, with large oval or subrounded punctures and a single row of small round punctures near borders. Scutellum broadly rounded posteriorly, finely punctulate. Elytra broad, evenly rounded laterally and posteriorly, just as broad at extreme base as prothorax; disc of each with small swellings on extreme base, humerus, third interpunctural area near base and before middle, the same carinate at beginning of apical declivity and feebly so before apex, an obliquely transverse ridge curving outward to middle of lateral margin from anterior end of postmedian longitudinal carina; surface seriate-punctate; explanate margins sparsely and irregularly impressed with coarse rounded or oblong punctures. Ventral surfaces micropunctulate; frons concave with a narrow median carina. Length 4.7–4.8 mm.; breadth 4.1–4.2 mm.

China: Northern Kwangtung (Lien-ping Distr.[1]). April.

Distribution: South China.

Notosacantha oblongopunctata (Gressitt), new combination

(Plate 30, figure 1)

Hoplionota oblongopunctata GRESSITT, 1938, Lingnan Sc. Jl., 17:573[1]. (Type in Lingnan Museum.)

Pitchy red-brown mixed with blackish on pronotal and elytral discs; explanate margins yellowish testaceous, tinged with reddish on sides of pronotal expansions and on posterolateral portions of elytra; ventral surfaces and legs reddish testaceous, duller on metasternum; antennae ochraceous.

Body rounded oblong in form, slightly over three-fourths as broad as long. Interocular process truncate apically, broader at apex than at base, narrowly and briefly emarginate at middle, not extending as far anteriorly as margins of pronotum, grooved between eyes. Pronotum practically as broad as elytra at base, rather evenly rounded from anterior emargination (which is near V-shaped) to posterolateral angles; anterior margin with fine, close serrations; disc fairly smooth; explanate margins with large deep oblong punctures. Elytra as broad as long, broadly rounded posteriorly, subparallel; discs shallowly punctured, subseriately so only at sides, inner costa prominent, interrupted at intervals, with two branches; explanate margins with deep, oblong, subseriate punctures. Length 4.2–4.4 mm.; breadth 3.1–3.3 mm.

China: Hainan Island (Sam-ah-kong[1]). January.

Distribution: Hainan Island.

Notosacantha sauteri (Spaeth), new combination

Hoplionota Sauteri SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64:295[1]; 1933, Wiener Ent. Ztg., 50:124; CHUJO, 1934, Sylvia, 5:149[2]. (Type in Spaeth collection.)

Dorsal surfaces pitchy red-brown, almost black on pronotal disc; explanate margins of pronotum and elytra pale blood-red, becoming ochraceous near outer borders; ventral surfaces pitchy black on thoracic sterna and ochraceous on abdomen; head reddish brown; antennae testaceous; legs reddish, darker basally.

Dorsal outline rounded-oblong, broadest near middle. Head with interocular process flat, broadly rounded apically. Pronotum slightly broader than elytra at extreme bases; explanate margin with oval or rounded punctures, feebly serrate margins and rounded anterolateral angles. Elytra rather evenly rounded to sutural angles; disc of each with an interrupted ridge in the third interpunctural area connecting with a subtransverse ridge just behind middle. Length 4.5 mm.; breadth 3.85 mm.

One (C.A.S.) Suisharyo, altitude 1100 meters, near Arisan, June 10, 1932, Gressitt.

China: Taiwan (Fuhosho[1], Koshun[2], Suisharyo).

Distribution: Taiwan.

Notosacantha sinica Gressitt, new species

(Plate 30, figure 2)

Largely black: head pitchy brown beneath; antennae pitchy black distally, reddish on basal segments; prothorax black above, pitchy beneath, with external margin narrowly amber; scutellum black; elytra black with borders amber, more widely so near sutural angles and with a narrow pale "window" on each explanate margin just anterior to middle, broadened at external margin; ventral surfaces pitchy black, paler to reddish brown on sides of abdominal sternites; legs pitchy, nearly black on femora.

Head with anterior process narrowed and subrounded apically, narrowly emarginate at middle of apex, somewhat flattened and depressed, with a raised margin bordering eyes and occiput raised on each side near margin of pronotum; frons with an oblique depression on each side. Antenna not reaching side of pronotum, slender basally, thickened and flattened in last five segments; scape stout; second segment slightly longer, and much thicker, than third. Prothorax nearly three times as broad as long, anterior emargination somewhat trapezoidal; external margin somewhat serrate, particularly near emargination; disc with three moderate depressions on each side, and some punctures of various sizes, mostly small; explanate margin somewhat frosted, with large round or oval punctures. Scutellum rounded-trapezoidal, convex and finely corrugated. Elytra somewhat broader than prothorax,

roughly squarish, rounded ectoapically, broadened behind humeri; disc of each sinuous in lateral outline, somewhat steeply declivitous posteriorly; first costa incomplete in middle, but represented by a low basal crest, a higher tubercle behind middle where costa is crossed by a subtransverse ridge, and raised again, with a short subtransverse ridge, at top of posterior declivity; second costa less complete, represented by humeral swelling, a very small tubercle behind and external to basal crest of first costa, and two small posterior tubercles, respectively external and posterior to last two tubercles of first costa; disc otherwise with partially regular rows of fairly close punctures; explanate margin with punctures of various sizes, mostly large, and with a thickened ridge a short distance from external margin; border very feebly serrate. Ventral surfaces finely striolate on metasternum and finely punctured or frosted on abdomen. Femora relatively long and slender. Length 4.8 mm.; breadth 4 mm.

Holotype (Lingnan Natural History Museum), **Ta-chu-lan, Shaowu,** altitude 1,200 meters, **northwestern Fukien Province, Southeast China,** April 25, 1943, T. Maa (Maa Tsing-chao).

Differs from *N. fumida* (Spaeth) in being smaller, more rectangular, largely black, with the pronotum more serrate anteriorly and with the explanate margins with more rounded punctures and the elytra more costate and tuberculate, with a narrower transparent "window" on side of each.

Distribution: Southeast China.

Notosacantha trituberculata Gressitt, new species

(Plate 30, figure 3)

Dorsal surfaces largely reddish brown; pronotal and elytral discs pitchy black tinged with reddish brown, particularly on swollen areas of former and sides of latter; explanate margins reddish brown, paler on pronotum near head and pronotal disc, and on each elytron at extreme apex and on an oval, subtransparent area at middle of each side, adjacent to disc; ventral surfaces and legs pale reddish testaceous, slightly darker on head.

Dorsal outline suboblong, slightly irregular at sides and sinuate anteriorly and posteriorly. Head with interocular process moderately short, slightly broadened distally and feebly convex on apical margin. Antenna not reaching side of pronotum; slender basally, much thicker distally. Pronotum nearly three times as broad as long, narrowed at sides, rounded at anterolateral angles, finely serrate on margins; disc irregularly punctured, an arcuate, largely impunctate raised band near base; explanate margins with moderately large rounded oval punctures. Elytra slightly broader than pronotum, widest in central portion, narrowed at humeri, rounded posteriorly; disc of each coarsely subseriate-punctate, puncture-rows interrupted by ridges and tubercles; three major tubercles, first near

base and fairly close to suture, second slightly behind middle and third at top of posterior declivity, each equidistant from suture and connected by a slightly irregular longitudinal ridge, another less regular longitudinal ridge connecting lateral ridges from tubercles along middle of disc; explanate margin widest at end of basal third, impressed with deep punctures of irregular shapes which are sparser on hyaline spot. Length 5 mm.; breadth 4.2 mm.

Holotype (California Academy of Sciences), **Rokki** (Rokkiri), altitude 350 meters, **near Kizan, southwestern Taiwan,** May 14, 1934, Gressitt.

Differs from *Notosacantha horrifica* (Boheman), new combination, from Ceylon, in having the pronotal margins evenly rounded anterolaterally and more transverse anteriorly, and the elytral discs less strongly raised postmedially, with the posterior tubercles no more than twice as high above surfaces of discs as anterior tubercles.

Distribution: Taiwan.

Subtribe **BASIPRIONOTINA**

Genus **Craspedonta** Chevrolat

Craspedonta Chevrolat, 1837, in Dejean, Cat. Col., ed. 3:391.

Calopepla Hope, 1840, Col. Man., 3:152; Boheman, 1950, Mon. Cassid., 1:8; Chapuis, 1875, Gen. Col., 11:370; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 306; new synonymy.

Head short, outline round in anterior view, well retracted into prothorax; frons broad, scutiform. Antennae stout; in male nearly as long as width of pronotum, with basal segments flattened and broadened distally, apical segments flattened and parallel-sided; in female barely two-thirds as long as width of pronotum, with basal segments relatively slender and subcylindrical, apical segments flattened. Pronotum transverse, obtusely emarginate anteriorly, barely exposing part of head; disc medially grooved; margins narrow, reflexed, of equal width throughout. Elytra much longer than broad, somewhat wider than pronotum, very narrowly margined, dentate on basal margin, coarsely punctured and rugose. Prosternum broad and flat, rounded posteriorly. Legs stout; tarsal claws large, untoothed, extending beyond lobes of third segment.

The genus contains but four or five species. I am indebted to the late Mr. H. S. Barber for calling my attention to the older valid name for the genus.

Generotype: *Imatidium leayanum* Latreille (India).

Range: Most of Oriental Region.

Craspedonta leayana insulana (Gressitt), new combination

(Plate 27, figure 8)

Calopepla leayana subsp. *insulana* Gressitt, 1938, Lingnan Sc. Jl., 17:187[1]; 574[2]. (Type in U.S.N.M.)

Pronotum and scutellum ochraceous and translucent to opaque cream-color or reddish; elytra brilliant metallic golden-green to blue-green; ventral surfaces ochraceous; head partly pitchy; antennae black on distal four and two-thirds segments; tarsi black.

Pronotum minutely punctulate, deeply grooved medially, a fovea on each side of middle of base. Scutellum longer than broad. Elytra nearly one-half again as broad as pronotum, deeply subseriate-punctate with most of interspaces costate and with some transverse rugae. Length 11–13.5 mm.; breadth 6.8–8 mm.

Host: The typical form feeds on *Gmelina arborea* Roxb. in Burma. This subspecies was taken feeding on a small tree which is very likely the same species, or a member of the same genus.

China: Hainan (Ta-hau, Ta-hian, No-kyu-chun, Nga-hon-tung[1], Cheung-kon, Tai-pin, Tai-tsing-lam[2]). March to July.

Distribution: Hainan Island.

Genus **Megapyga** Boheman

Megapyga Boheman, 1850, Mon. Cassid., 1:40; Chapuis, 1875, Gen. Col., 11:369.

Prothorax feebly emarginate anteriorly; head visible from above; body strongly broadened and rounded posteriorly; explanate margins of elytra very narrow; elytra metallic or partly metallic, deeply and subseriately punctured.

China is somewhat outside of the expected zoogeographical range of the genus, as far as the known distribution of the species is concerned.

Generotype: *Megapyga coeruleomaculata* Boheman (Philippines).

Range: Malay Archipelago; Philippine Islands; China.

Megapyga chinensis Spaeth

Megapyga chinensis Spaeth, 1936, Proc. Roy. Ent. Soc. London, B, 5:8[1]. (Type in British Museum.)

Elytra metallic blue; prothorax reddish yellow with an anteriorly narrowed black median line; occiput and scutellum black; ventral surfaces, legs (with exception of the black tarsi), the scape entirely, and the undersides of the following three antennal segments, reddish yellow.

Very similar to *M. eximia* Boheman, with much coarser puncture-rows on the unicolorous blue elytra, shorter prothorax, thicker margins of prothorax and elytra; the sides of the prothorax run in a straight line without emargination to the anterior corners. Length 7 mm.; breadth 5.25 mm. (After Spaeth).

China: Cho-Ganh[1]. August.

Distribution: South China.

Genus **Epistictia** Boheman

Epistictia Boheman, 1850, Mon. Cassid., 1:12; Chapuis, 1875, Gen. Col., 11:371; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 318.

Head very short, transversely rounded oval; mouthparts not retracted into prothorax; clypeus nearly three times as broad as long, chevron-shaped; eyes slender, elliptical. Antennae stout, compact, cylindrical basally and compressed and broadened distally, segments parallel-sided, about as long as width of pronotum in male and somewhat shorter in female. Pronotum transverse, trapezoidal, broadly and shallowly emarginate apically, exposing part of head, narrowly margined laterally. Scutellum transversely semicircular. Elytra oval, as broad as pronotum basally, coarsely punctured. Metasternum broad, rounded posteriorly. Tarsi broad; claws simple and reaching beyond lobes of third segment.

Generotype: *Epistictia viridimaculata* Boheman (India to Malaya).

Range: Oriental region.

Epistictia viridimaculata Boheman

Epistictia viridimaculata Boheman, 1850, Mon. Cassid., 1:15[1]; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 320, fig. 99[2]; Chen, 1935, Sinensia, 6:780[3], fig. 6; Gressitt, 1938, Lingnan Sc. Jl., 17:576[4]. (Type in Geneva Museum.)

Epistictia perplexa Baly, 1863, Jl. Ent., 2:7[5].

Epistictia Parryi Baly, 1863, l.c.:8[6].

Epistictia marginata Kirsch, 1875, Mitt. Zool. Mus. Dresden, 1:56[7].

Epistictia viridimaculata var. *collaris* Weise, 1897, Deutsche Ent. Zeits. 1897:99[8].

Dorsal surfaces brick-red to blood-red; pronotum with a metallic greenish spot on each side of disc near base; each elytral disc with seven similar spots of varying sizes arranged somewhat in zig-zag fashion; lateral margins of pronotum translucent and amber colored; antennae black except for first two or three segments which are reddish; mesepisternum blackish.

Dorsal outline subovate; body not very strongly convex. Pronotum deeply punctured on disc, densely so except near center, evenly narrowed and slightly convex at sides. Elytra deeply and densely punctured, irregularly so beyond raised second interspace; margins very narrow. Length 6.8–11.5 mm.; breadth 4.6–6.7 mm.

China: Kweichow[3]; Kwangsi (Lung-chow[4]).

Distribution: India (Nepal[1]); Assam[2,6]; Burma[2,8]; Southwestern China; Indo-China[5]; Siam[2]; Malacca[7].

Genus **Stenoprioptera** Spaeth

Stenoprioptera Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (132).

Explanate margins of prothorax narrow, with thickened borders; prothorax broadly and shallowly emarginate anteriorly, where the borders are less thick; corners at anterior emargination obtusely angulate; explanate margins of elytra narrow, hardly widened in middle, forming a narrow strip posteriorly, thickened on the borders; prosternum feebly broadened posteriorly, lacking impressions.

Orthogenerotype: *Stenoprioptera tibetana* Spaeth (Yunnan; Tibet).

Range: Western China.

Stenoprioptera tibetana Spaeth

Stenoprioptera tibetana Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (132[1]). (Type in Manchester Museum.)

Narrowly ovate, swollen, slightly shiny; ventral surfaces, legs, antennae, scutellum and occiput black; head reddish; prothorax and elytra yellow, black on basal teeth and posterior extremity of suture and with three black spots on each: (1) round, on humeral swellings, (2) round, behind middle near suture, (3) transverse, bar-shaped, posteriorly on the expanded margin. Antennae as in *Basiprionota*, thick, cylindrical, elliptical in cross-section distally, no distinct division between basal and distal segments, basal segments with isolated round punctures, distal segments successively wider, with longitudinal ridges; third segment shorter than second, fourth longer than other basal segments. Pronotal disc swollen, with a fine, impressed median line and obsolescent puncturation; basal margin twice deeply sinuate. Elytra closely meeting prothorax basally, broadened posteriorly in a straight line on each side to behind middle, broadly rounded posteriorly; discs moderately swollen, coarsely, but not very deeply, punctured, subseriately so near suture and margin, irregular between; second and fourth interpunctural spaces broader, more regular and higher. Length 9.5 mm.; breadth 7 mm.

Seven (U.S.N.M.) near Fu-lin and west of Fu-lin, altitude 4,000–8,500 feet, July 18 to August 15, 1928, D. C. Graham.

China: Yunnan[1]; Szechuan (Fu-lin); Tibet (Yerkalo[1]). The locality Yerkalo is possibly in Sikang instead of Tibet proper, though Spaeth considers it in the Paleartic region.

Distribution: West China.

Genus **Basiprionota** Chevrolat

Basiprionata Chevrolat, 1837, in Dejean, Cat. Col., ed. 3:391.

Prioptera Hope, 1840, Col. Man., 3:153, 176; Boheman, 1850, Mon. Cassid., 1:44; Chapuis, 1875, Gen. Col., 11:368; Wagener, 1881, Mitt. Münch. Ent. Ver., 5:27; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 310; Spaeth, 1926, Best.-Tab. Eur. Col., 95:7; new synonymy.

Head short and deep, outline circular in anterior view; vertex medially grooved; frons transverse. Antennae often nearly one-half as long as body

in male, shorter in female, moderately stout, cylindrical, somewhat flattened distally; basal segments short, distal ones longer with last segment longest. Pronotum strongly transverse, broadly and deeply emarginate anteriorly, exposing most of dorsal surface of head; basal margin prominently trilobed; explanate margins moderately broad at sides. Elytra about as broad as pronotum basally, often considerably broadened posteriorly; explanate margins generally widened near middle; discs subregularly to irregularly punctured, often with some depressions and raised longitudinal lines. Legs moderately stout; tarsi large; claws large and extending beyond lobes of third segment.

The genus contains about 50 species, most of them in the Indo-Chinese and Indo-Malayan subregions. I am indebted to the late Mr. H. S. Barber for calling my attention to the earlier valid name.

Generotype: *Cassida octopunctata* Fabricius (Siam; Java; Borneo).

Range: Oriental region, including Philippine Islands.

Key to the Chinese Species of Basiprionota

1. Elytral discs either largely black or with two or more small black spots; pronotum either spotted or not, but not distinctly grooved medially 2
— Elytral discs immaculate; pronotum not clearly marked, but generally with a distinct median groove 4

2.(1) Pronotum with a pair of small black dots or a pitchy area on each side of middle; elytral discs with a large black area or several small black dots 3
— Pronotum immaculate; elytral discs each with a small black spot behind middle near suture; last two antennal segments black ..... *B. maculipennis reducta*

3.(2) Pronotum with a pair of small distinct round black spots; elytral discs each with about three small black spots, closely and deeply punctured; last four antennal segments black ..... *B. multipunctata*
— Pronotum with a vague pitchy brown area on each side of center; elytral discs largely black, explanate margins each with a large posterolateral black spot; elytra finely and sparsely punctulate; only last antennal segment black ..... *B. whitei*

4.(2) Body not much longer than broad 5
— Body one-half again as long as broad; elytral discs fairly even; explanate margins distinctly produced at sutural angles ..... *B. angusta*

5.(4) Elytral discs rather uneven, with a conspicuous depression anterior to middle of disc of each 6
— Elytral discs not very uneven, with only a shallow depression near middle of disc ..... *B. bisignata*

6.(5) Pronotum with lateral margins of disc strongly arcuate; four or five irregular rows of punctures between first and second ridges just behind middle of each elytron; size small: 9–10 mm. in total length ..... *B. bimaculata*
— Pronotum with lateral margins of disc not strongly arcuate; seven to nine irregular rows of punctures between first and second ridges just behind middle of each elytron; size large: 11–16 mm. in total length ..... *B. chinensis*

Basiprionota angusta (Spaeth), new combination

Prioptera angusta Spaeth, 1914, Suppl. Ent., 3:17[1]; Chujo, 1934, Sylvia, 5:147[2]. (Type in Berlin Museum.)

Prioptera angusta ab. *fulva* Chujo, 1934, l.c.[3].

Dorsal surfaces pale ochraceous; explanate margins paler, those of each elytron with a small pitchy spot near posterolateral portion of disc; ventral surfaces pale to dull testaceous; antennae with last two segments black, preceding ones partly pitchy.

Form elongate, more than one-half again as long as broad; fairly convex. Pronotum with disc evenly convex, feebly grooved medially and sparsely punctulate and margins relatively narrow. Elytra long; discs slightly uneven, irregularly punctured; explanate margins narrow, somewhat produced at extreme apices where they are as broad as at middle of sides.

Some (C.A.S.) Kuraru, southern Taiwan, June 10, 1932, and August 10, 1934, Gressitt.

China: Taiwan[1,2,3] (Sozan, Horisha, Kosempo, Koshun, Kankau, Kuraru). April to October.

Distribution: Taiwan.

Basiprionota bimaculata (Thunberg), new combination

(Text figure 1, page 536; pupa)

Cassida bimaculata Thunberg, 1789, Nov. Ins. Spec., 5:86, pl. 5, fig. 93[1]. (Type in Upsala Museum.)

Cassida bimacula Herbst, 1799, Natursyst. Käfer, 8:262, pl. 132, fig. 4.

Prioptera bimaculata Boheman, 1850, Mon. Cassid., 1:52; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 317[2].

Dorsal surfaces yellowish brown; each elytron with a round black spot on posterolateral portion of explanate margin; distal six antennal segments black or largely black.

Dorsal outline subrounded. Pronotum finely and closely punctate. Elytra as broad basally as pronotum, convex, shiny, finely and closely punctate; punctures partly arranged in longitudinal rows; disc of each slightly raised behind scutellum and with two depressions externally. Length 9–10 mm.; breadth 8 mm.

Several (Lingnan & C.A.S.) Suisapa, Lichuan, July 23—August 22, 1948, Gressitt, on *Premna* and *Liquidambar*.

Hosts: *Premna, Liquidambar formosana* Hance.

China: "China"[1]; Hupeh (Lichuan).

Distribution: South China; Assam[2].

Basiprionota bisignata (Boheman), new combination

(Plate 27, figure 9)

Prioptera bisignata Boheman, 1862, Mon. Cassid., 4:22[1]; Weise, 1912, Arch. f. Naturg., 78 A 2:96[2]; Spaeth, 1926, Best.-Tab. Eur. Col., 95:8. (Type in Stokholm Museum.)

Prioptera chinensis, Gressitt *(not* Fabricius), 1939, Pan-Pac. Ent., 15:138[3].

Dorsal surfaces pale ochraceous; explanate margins paler, immaculate, or with a feeble suggestion of a posterolateral spot on each elytron; ventral surfaces black on most of metasternum and parts of abdominal sternites; legs pale with tarsi and femora marked with black; antennae with sixth to ninth segments partly pitchy and last two black.

Pronotum smooth, medially grooved, minutely punctulate, with narrow margins. Elytra fairly long; disc of each with two subsinuate feebly raised lines and two or three depressed areas on basal half; explanate margins not very broad, widest near middle. Length 11.5–13 mm.; breadth 7.5–10 mm.

Six (U.S.N.M.) "China," F. N. Meyer; (Heude) Tien-mu Shan, May, 1937 Piel.

China: North China[1]; Shantung (Tsingtao[2]); Chekiang (Hangchow[3], Tien-mu).

Distribution: Eastern China.

Spaeth (1926, p. 8) refers to *B. pallida* Wagener, 1881, as an aberration of this species, and as occurring only in South China, whereas *B. pallida* is listed as from Malacca in the Coleopterorum Catalogus (Spaeth, 1914, p. 18).

Basiprionota chinensis (Fabricius), new combination

(Plate 27, figure 7)

Cassida chinensis Fabricius, 1798, Syst. Ent. Suppl., 84[1]; 1801, Syst. Eleuth., 1:402; Herbst, 1799, Natursyst. Käf., 8:353. (Type in Lund Museum.)

Prioptera satrapa Boheman, 1862, Mon. Cassid., 4:17[2].

Prioptera chinensis, Weise, 1910, Verh. Naturf. Ver. Brünn, 48:42; Weise, 1912, Arch. f. Naturg., 78 A 2:96; Spaeth & Reitter, 1926, Best.-Tab. Eur. Col. 95:8[3]; Liu, 1936, Lingnan Sc. Jl., 15:256[4].

Prioptera bimaculata, Gressitt *(not* Thunberg), 1938, op. cit., 17:575[5].

Large, nearly round in outline. Dorsum testaceous, shiny, each elytron marked with a larger or smaller black spot on explanate margin behind middle; antennae with apical two or three segments black or largely black; occiput pitchy; ventral surfaces entirely testaceous or with metasternum partly black on sides of posterior portions, or on middle; legs testaceous, with undersides of femora and tibiae generally partly blackish. Antennae more than one-half as long as body in male, more than one-third as long in

female; prothorax deeply emarginate, minutely punctate, feebly grooved medially, evenly convex at sides; scutellum longer than broad; elytra somewhat uneven, not very heavily punctured except along suture and on depressed areas; explanate margins impunctate; broadest before middle in male and at middle in female. Length 11–16 mm.; breadth 9.5–14 mm.

Ten (A.M.N.H.) Yen-ping, May, 1916, April, June and July, 1917, H. Caldwell; (Heude) Tien-mu Shan, May, Ihing, July; (M.C.Z.) Kiukiang, June, 1887, A. E. Pratt; Chungking, Szechuan, June, 1932, G. Liu; (Lingnan) Behludin, August 21, 1940, Gressitt; (U.S.N.M.) Yachow, 2,000 feet, July, 1928, Muping, August 25, 1929, Wen Chuan Shien, 11,500 feet, 30 miles NNW. of Kuanshien, 1933, Wentang, 11,000 feet, 14 miles S. of Chungking, June 28, 1933, and Suifu, May 1, 1929, D. C. Graham; (Lingnan) Chang-ting, June, 1940, Maa. Four (U.S.N.M.) Chin-ling Mountains, Shensi, April-May, 1904, by Eliot Blackwelder are questionably referred to this species.

China: Sikang (Yachow, Muping); Szechuan (Wasse-Kou[3], Chungking, Wen Chuan Shien, Wentang, Suifu, Behludin); Kiangsi (Kiukiang); Kiangsu[2,4] (Shanghai, Ihing); Chekiang (Tien-mu); Fukien (Yen-ping, Chang-ting); Kwangtung[5] (Lin-chow). May to August.

Distribution: South China[1].

Basiprionota maculipennis reducta (Gressitt), new combination

(Plate 27, figure 6)

Prioptera maculipennis subsp. *reducta* Gressitt, 1938, Lingnan Sc. Jl., 17:185[1], 575[2]. (Type in U.S.N.M.)

Dorsal surfaces yellowish ochraceous to dirty testaceous, transparent to opaque on discs, fairly transparent on explanate margins; disc of each elytron with a small squarish spot, sometimes vague, at top of posterior declivity near suture, and explanate margin of each with a large squarish spot on posterolateral portion; ventral surfaces black on part of metasternum; antennae dusky to black on last two or more segments.

Pronotum evenly convex, ungrooved and impunctate on disc, not very broad on explanate margins. Elytra with suture raised behind scutellum, discs each with two irregular depressed areas near middle and subregularly punctured; explanate margins suddenly broadened behind humeri in male, gradually broadened to behind middle in female, much narrower apically. Length 9.5–11 mm.; breadth 7.5–8.5 mm.

China: Hainan[1,2] (Ta-hian, Ta-hau, Faan-no, Nai-suen, Tai-pin, Cheungkon). June to September.

Distribution: Hainan Island.

Basiprionota multipunctata (Gressitt), new combination

Prioptera multipunctata GRESSITT, 1938, Lingnan Sc. Jl., 17:186[1], 575. (Type in C.A.S.)

Dorsal surfaces dull ochraceous, paler, subtransparent and reticulate on explanate margins; pronotum marked with a pair of widely spaced round black dots on disc; elytra with three small black spots on disc of each: (1) largest, oval, near scutellum, (2) narrow, oblique, behind humeral callus, (3) smallest, rounded-oval, on third interpunctural strip behind middle; explanate margin of each elytron with a small, narrow black spot on posterolateral portion; antennae with distal half pitchy, becoming black near apices; ventral surfaces with metasternum partly black.

Pronotum smooth, evenly convex, impunctate and ungrooved on disc, slightly depressed anterior to median posterior lobe; explanate margins of equal width along sides. Elytra with discs very closely, and in part irregularly, punctured, each with two feebly depressed areas near middle and none of interpunctural strips distinctly raised; explanate margins gradually widened behind humeri, broadest near middle, narrow distally, and slightly thickened along borders. Length 7.4 mm.; breadth 5.4 mm.

China: Hainan (Ta-hau[1]); July.

Distribution: Hainan Island.

Basiprionota whitei (Boheman), new combination

(Plate 27, figure 4)

Prioptera Whitei BOHEMAN, 1856, Cat. Col. Ins. Brit. Mus., 9:11[1]; 1862, Mon. Cassid., 4:26; SPAETH & REITTER, 1926, Best.-Tab. Eur. Col., 95:8; LIU, 1936, Lingnan Sc. Jl., 15:25[2]. (Type in British Museum.)

Prioptera trabeata FAIRMAIRE, 1888, Ann. Soc. Ent. France, 32:46[3].

Prioptera whitei trabeata, SPAETH, 1914, Col. Cat., 62:19; GRESSITT, 1938, Lingnan Sc. Jl., 17:383[4], 577[5]; 1938, Pan-Pac. Ent., 15:139[6].

Dorsal surfaces ochraceous with disc of each elytron black except for borders, explanate margins of each elytron with a broad black spot on posterolateral portion and pronotal disc with or without a dusky to blackish spot on each side of middle; antennae with two distal segments black; ventral surfaces with metasternum largely black.

Pronotum with disc smooth, feebly grooved medially and depressed opposite scutellum. Elytra minutely and irregularly punctured except along borders and in each of two depressed areas near middle of each; explanate margins fairly broad, evenly widened behind humeri, hardly less than one-half as broad at apices as at middle of sides. Length 10–11.5 mm.; breadth 8–9.2 mm.

Several (C.A.S.) Hangchow, May 25, 1932, E. C. Van Dyke; (A.M.N.H.) San-chiang, Foochow, and "Foochow region to Kuatun region" (Min River),

1927, C. H. Pope; (U.S.N.M.) Kiukiang, June, 1887, Pratt; Mokan Shan, N. Gist Gee; Kuling, May 30, 1936, C. Y. Wong; (Lingnan) Shaowu, Chungan, Kien-yang, Chang-ting, Tai-yu, April-August, Maa.

China: Kiangsu[2]; Chekiang[6] (Mokan Shan, Cha-yuan, Hangchow); Kiangsi[3] (Wong-sa-shue, Hong Shan[4], Kiukiang, Kuling, Tai-yu); Central China[1]; Fukien (Liung-chon San, Gang-keu[4], San-chiang, Min River, Shaowu, Chungan, Kien-yang, Chang-ting); Hunan[5] (Lam-mo); Kwangtung[5] (Lien Distr., Yao Shan, Yim-na Shan, Tsin-leong Shan). May and September (Chekiang); May to July (South China).

Distribution: Eastern and South China.

Tribe **ASPIDOMORPHINI**

Aspidomorphini of authors.

Tarsal claws with a comblike set of teeth on one or both sides of each claw. Pronotum not emarginate anteriorly. Posternum not grooved for reception of antennae.

Genus **Aspidomorpha** Hope

Aspidomorpha HOPE, 1840, Col. Man., 3:158; BOHEMAN, 1854, Mon. Cassid., 2:242; CHAPUIS, 1875, Gen. Col., 11:401; WEISE, 1897, Deutsche Ent. Zeits., 1897:105; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 324.

Head subrounded in anterior outline, strongly oblique in lateral outline; fronto-clypeus smooth, evenly raised to apex below antennal insertions. Antennae barely reaching to lateral angles of prothorax; basal segments very slender, subcylindrical; distal four or five segments thicker, somewhat flattened. Prothorax transversely elliptical, much narrower than elytra; lateral angles broadly rounded; explanate margins smooth, as large in area as disc, or larger. Elytra generally with a conical tubercle at suture a short distance behind scutellum; discs smooth or irregular, finely seriate-punctate; explanate margins very broad, occupying about as much area as discs, feebly declivitous. Prosternum fairly narrow between anterior coxal cavities, more than three times as wide, and broadly rounded, posteriorly. Tarsi fairly narrow; claws extending slightly beyond apex of third segment, each claw with a several-toothed comb on each side.

Generotype: *Cassida miliaris* Fabricius (Oriental region).

Range: Ethiopian and Oriental regions; North China; Siberia; Japan.

As far as the Oriental species seen by the writer are concerned, *A. miliaris* Fabricius, the generotype, falls in a group apart from the remainder of the species in the genus, since the larva is quite different from the known larvae of other species and the adult lacks the dorsal tubercle of the elytra and is excessively broad, sometimes being broader than long.

KEY TO THE CHINESE SPECIES OF ASPIDOMORPHA

1. Elytral discs evenly convex and smooth, lacking a postbasal tubercle..... 2
— Elytral discs with a common, subacute tubercle at suture a short distance behind scutellum 3

2.(1) Length of body 10–13.5 mm.; elytra marked with black spots or patches.... *A. miliaris*
— Length of body 6–7 mm.; elytral discs and marginal patches red-brown..... *A. transparipennis*

3.(1) At least anterior angles of explanate margins of elytra with pigmented patches extending to lateral borders..... 4
— Neither anterior nor posterior lateral angles of explanate margins of elytra with dark patches reaching to lateral borders; body rounded; last two antennal segments black..... *A. fuscopunctata*

4.(3) Size large; at least 10 mm. in body length..... 5
— Size small; under 8.5 mm. in length of body..... 6

5.(4) Form rounded; posterolateral angles of explanate margins of elytra with at least partial pigmented patches; elytral discs irregular..... *A. sanctae-crucis*
— Form subtriangular, broadest near anterior angles of explanate margins; posterolateral angles of explanate margins with pigmented area; elytral discs fairly even behind middle..... *A. dorsata*

6.(4) Only anterior angles of explanate elytral margins with dark spots..... 7
— Both anterior and posterior angles of explanate elytral margins with dark areas 8

7.(6) Explanate margins of elytra deeply pigmented along suture at apex; last two antennal segments black..... *A. chandrika*
— Explanate margins of elytra not pigmented along suture at apex; last two antennal segments only slightly pigmented..... *A. furcata*

8.(6) Elytra finely punctate-striate without depressions; elytral discs yellowish-brown; body outline ovate..... *A. difformis*
— Elytra with nine rows of strong punctures and one or two depressions; elytral discs dark brown; body outline nearly round..... *A. indica*

Aspidomorpha chandrika Maulik

Aspidomorpha chandrika MAULIK, 1918, Ann. Mag. N. H., (9) 1:322[1]; 1919, Fauna Brit. Ind., Hisp. & Cass.: 331, fig. 102[2]; GRESSITT, 1938, Lingnan Sc. Jl., 17:577[3]. (Type in Indian Museum.)

Golden in life; or with elytral discs dark reddish brown. Dried specimens whitish testaceous to dark reddish brown; pronotum pale testaceous, more yellowish on disc; elytra with discs reddish testaceous to dark reddish brown; pale on parts of base, including anterior side of tubercle; explanate margins pale testaceous with bases reddish brown.

Dorsal outline rounded-oval. Pronotum nearly twice as broad as long, evenly arcuate anteriorly, rounded-angulate at sides. Elytra with humeri

subangulate and slightly projecting, dorsal tubercle subacute and punctures almost lacking on inner half of posterior two-thirds: Length 7–7.5 mm.; breadth 5.8–6.5 mm.

Host: *Ipomoea* sp.

China: Hainan Island (Tai-pin-ts'uen, Sam-ts'uen-kai-hui[3]).

Distribution: India[1]; Burma[2]; Hainan Island.

Aspidomorpha difformis (Motschulsky)

Deloyala difformis MOTSCHULSKY, 1860, Etud. Ent., 9:27[1]. (Type in Moscow Museum?.)

Aspidomorpha difformis, BOHEMAN, 1862, Mon. Cassid., 4:277, BALY, 1874, Trans. Ent. Soc. London, 1874:211[2]; KRAATZ, 1879, Berl. Ent. Zeits., 23:270; GORHAM, 1885, Proc. Zool. Soc. London, 1885:280[3]; WEISE, 1900, Arch. Naturg., 66:295; MATSUMURA, 1907, Thous. Ins. Japan, 4:39, pl. 58, fig. 34; SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.):(129)[4]; 1926, Best.-Tab. Eur. Col., 95:10; DOI, 1926, Dobutsug. Zasshi, 39:337; YOKOYAMA, 1930 (Col. of Japan), 1:20, pl. 2, fig. 6; YUASA, 1932, Nippon Konchu Zukan: 587[5], fig. 1147; CHUJO, 1934, Sylvia, 5:152; GRESSITT, 1939, Pan-Pac. Ent., 15:139[6].

Aspidomorpha difformis ab. *japonica* SPAETH, 1926, Best.-Tab. Eur. Col., 95:10[7]; YUASA, 1932, Nippon Konchu Zukan: 587; CHUJO, 1934, Sylvia, 5:153; SPAETH, 1942, Arb. morphol. taxon. Ent. Berlin-Dahlem 9:12 (Erzendjanzsy, Manchuria).

Pronotal disc yellow; elytral discs dull testaceous, feebly marked with reddish to completely dark pitchy brown; explanate margins hyaline, fairly transparent, a distinct black patch on humerus and another on posterolateral portion of each elytron; ventral surfaces brownish testaceous; legs pale; antennae pale except for distal segment.

Rounded-oval in outline; feebly convex; elytra bluntly tuberculate behind scutellum. Prothorax transversely elliptical, rounded at sides. Elytra distinctly broader than prothorax; humeri rounded, slightly projecting; discs finely seriate-punctate, the punctures arranged at somewhat irregular intervals in many of the rows. Length 8–9.5 mm.; breadth 6.4–7 mm.

Some (Lingnan) Shaowu and San-kang, May 8 to June 9, 1943, Maa; (C.A.S.) Rikuchiu, July, 1916, J. C. Thompson, Tokyo, 1931, Gressitt, Kyoto, July, 1923, E. C. Van Dyke, Japan.

Hosts: *Calystegia sepium* var. *japonica* Makino; *Chenopodium* sp.

China: Manchuria[2] (Chin San, Weisohn[6]); Chekiang[6] (Hangchow, Mokan Shan); Fukien (Shaowu, Sankang). May to August (Japan); August-September (Manchuria); May, June and September (southeastern China).

Distribution: Hokkaido[3]; Honshu[3,7]; Kyushu[3]; Ryukyu Islands[5] (Okinawa); Korea[4]; eastern China; eastern Siberia[2] (Ussuri[7]; Amur[1]).

Aspidomorpha dorsata (Fabricius)

(Plate 27, figure 3)

Cassida dorsata FABRICIUS, 1787, Mant. Ins., 1:64[1]; 1792, Ent. Syst., 1:301; 1801, Syst. Eleuth., 1:401; LINNAEUS, 1787, Syst. Nat., ed. 13, Gmelin 1, 4:1641; HERBST, 1799, Natursyst. Käf., 8:342. (Type in British Museum.)

Aspidomorpha dorsata, BOHEMAN, 1854, Mon. Cassid., 2:296; SPAETH, 1914, Col. Cat., 62:68[2]; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 332[3]; GRESSITT, 1938, Lingnan Sc. Jl., 17:188[4], 578[5].

Aspidomorpha calligera BOHEMAN, 1854, Mon. Cassid., 2:297[6]; WEISE, 1897, Deutsche Ent. Zeits., 1897:104[7] (= *dorsata*).

Dorsal surfaces with explanate margins hyaline, shiny and fairly transparent except for humeri which are reddish brown; pronotal disc testaceous brown, generally transparent; elytral discs testaceous brown to dark reddish brown, darker areas mostly at sides and along suture, often as spots; ventral surfaces testaceous; antennae with last two segments black.

Dorsal outline rounded-triangular. Pronotum twice as broad as long, elliptical; lateral angles rounded, placed slightly behind middle. Elytra one-half again as broad as pronotum; humeri prominent and rounded; explanate margins very wide, broader anteriorly than discs; discs finely seriate-punctate; dorsal tubercle acute. Length 10–13 mm.; breadth 8.7–12 mm.

Host: *Ipomoea* sp.

China: Hainan[4,5] (Ta-hian, Nodoa, Tai-pin, Nan-fung, Kachek, Cheung-kon). April to July.

Distribution: India[3,6,7]; Ceylon[3]; Assam[3]; Burma[3]; Hainan Island; Siam[1]; Malaya[2]; Sunda Island[2]; Celebes[3].

Aspidomorpha furcata (Thunberg)

(Plates 31 and 32; plate 36, figures 1, 4, and 7)

Cassida furcata THUNBERG, 1789, Nov. Ins. Spec., 5:87, pl. 5, fig. 96[1]; HERBST, 1799, Natursyst. Käf., 8:265, pl. 132, fig. 7. (Type in Copenhagen University Museum.)

Cassida dorsata OLIVIER (*not* Fabricius), 1790, Enc. Meth., 5:386; 1808, Ent., 6:961; 97, pl. 3, fig. 45.

Cassida micans FABRICIUS, 1801, Syst. Eleuth., 1:398[2].

Aspidomorpha micans BOHEMAN, 1854, Mon. Cassid., 2:313; WIESE, 1901, Deutsche Ent. Zeits., 1901:52.

Aspidomorpha furcata, WEISE, 1897, op. cit., 1897:104[3]; SPAETH, 1913, Ann. Mus. Nat. Hung., 11:464; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 333[5]; MIWA, CHUJO & MITONO, 1932, Trans. Nat. Hist. Soc. Formosa, 22:304[6]; CHUJO, 1934, Sylvia, 5:151; LIU, 1936, Lingnan Sc. Jl., 15:257[7]; GRESSITT, 1938, op. cit., 17:189[8], 384[9], 578[10]; 1939, Pan-Pac. Ent., 15:139[11].

BIOLOGY: KERSHAW & MUIR, 1907, Trans. Ent. Soc. London, 1907:250; HUTSON, *et al.*, 1929. (See section on bionomics.)

Brilliant golden in life; sometimes with discs dark purplish brown. Dried specimens with dorsal surfaces pale testaceous to reddish brown; pronotum testaceous with explanate margins transparent; elytra with discs testaceous, generally with most of punctures, sides, dorsal tubercle and one or two oblique lines on posterior portion reddish; explanate margins of elytra with bases narrowly reddish brown, remainder very pale and transparent, sometimes slightly pigmented near borders.

Dorsal outline subrounded, slightly longer than broad. Pronotum transversely elliptical, twice as broad as long, with narrow lateral angles placed slightly behind middle. Elytra with humeri rounded and feebly projecting; discs with dorsal tubercle subobtuse and blunt and punctures sparse on inner half. Length 6.6–8.8 mm.; breadth 5.5–7.2 mm.

Some (M.C.Z.) Kiangsu; Kweiping & Pingloo, Gaines Liu; (A.M.N.H.) Yen-ping, Spring, 1915, May, 1916 and June 17, 1917, Harry Caldwell; (U. Nanking) Chengtu; (C.A.S.) Formosa: Hori, June 7, Rokki, May 17, Kuraru, August 9, 1934, Gressitt; (Lingnan) Si-tsin-chi, Lung-chi, August 30, 1940, Maa; Luichow Peninsula, August, 1950.

Hosts: *Ipomoea Batatas* Lamk.; *I. aquatica* Forsk.; *I. cairica* Sweet; *I. digitata Linn.; ? Colocasia antiquorum* var. *esculenta* Schott (Aroideae).

China: Kiangsu; Fukien (Yen-ping, Amoy[7], Shanghang[9], Lung-chi); Kwangtung[9,10] (Tsin-leong Shan, Tai-yong, Canton, Ts'in-pei, San-po-hui, Yam-na Shan, Yao Shan, Sheung-shui-heung, Luichow); Hong Kong[11]; Kwangsi (Kweiping, Pingloo); Hainan Island[8,10] (Fan-ta, Ta-hian, Ta-hau, Cheung-kon, Liamui, Hoihow, Kachek, Nam-ting-ts'uen, Kom-yan, Lokkei, Nodoa, Dome Mountain, Nam-fung, Tai-pin, Tai-tsing-lam-ts'uen, Nam-liu-ting); Szechuan (Chengtu); Taiwan[4] (many localities); Botel-Tobago Island[6]. All the year round at Canton.

Distribution: India[3]; Ceylon[5]; Assam[5]; Burma[5]; South China; Hainan; Formosa; Indo-China[11]; Thailand[1] Malaya; Sunda Island[2].

Aspidomorpha fuscopunctata Boheman

Aspidomorpha fuscopunctata Boheman, 1854, Mon. Cassid., 2:298[1]; Weise, 1857, Deutsche Ent. Zeits., 1897:104[2]; Spaeth, 1912, Sarawak Mus. Jl., 1:117[3]; 1914, Col. Cat., 62:68[4]; Maulik, 1919, Fauna Brit. Ind., Hisp. Cass.: 326[5]; Gressitt, 1938, Lingnan Sc. Jl., 17:189[6], 579[7]; 1939, Pan-Pac. Ent., 15:140[8] (Type in Stockholm Museum.)

Aspidomorpha rubrodorsata Boheman, 1854, Mon. Cassid., 2:310[9].

Iridescent greenish golden in life. Dried specimens with dorsal surfaces yellowish testaceous; pronotal and elytral discs subtransparent, latter with punctures appearing reddish brown in certain lights; explanate margins quite transparent, very pale, sometimes darker near borders.

Nearly circular in dorsal outline. Pronotum transversely elliptical, sub-

angulate posterolaterally, not quite twice as broad as long. Elytra nearly twice as broad as pronotum; humeri rounded, slightly projecting beyond lateral angles of pronotum; discs with a common tubercle behind scutellum forming a right angle in lateral outline, seriate-punctate with irregularly spaced punctures. Length 9–9.4 mm.; breadth 8.2–8.5 mm.

China: Kwangtung[7] (Yao Shan); Hainan[6,8] (Ta-hian, Five Finger Mountains, Liamui, Nodoa).

Distribution: India[2]; Burma[2]; Indo-China[7]; South China[4]; Hainan; Malaya[5]; Sunda Islands[1,3,9]; Philippines[7].

Aspidomorpha indica Boheman

Aspidomorpha indica BOHEMAN, 1854, Mon. Cassid., 2:318[1]; WEISE, 1905, Deutsche Ent. Zeits., 1905:123; SPAETH, 1913, Ann. Mus. Nat. Hung., 11:46[2]; 1914, Col. Cat., 62:68[3]; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 327; CHUJO, 1934, Sylvia, 5:153; GRESSITT, 1939, Pan-Pac. Ent., 15:140[4]. (Type in British Museum.)

Golden in life; dried specimens with pronotum and elytral margins pale hyaline yellow, transparent, latter with two dark-brown spots on each side: at humerus and on posterolateral area; elytral discs pale testaceous to dark reddish brown, often faintly marked with reddish on pale background; ventral surfaces pale; antennae with apical two or three segments black.

Subcircular in outline, very slightly longer than broad. Prothorax transversely elliptical, twice as broad as long, broadly rounded laterally. Elytra slightly broader than prothorax; humeri rounded, slightly projecting; explanate margins broad; discs tuberculate behind scutellum, finely seriate-punctate. Length 6.4–7.8 mm.; breadth 5.8–6.7 mm.

One (Lingnan) Nan-yo-miao, 1,000 meters, on bindweed, May, 1940, Richardson.

Host: *Ipomoea* sp.; *Convolvulus japonicus* Thunberg (?)

China: Yunnan[3]; Szechuan (Nan-yo-miao); Taiwan (Arisan, Kosempo[2]).

Distribution: India[1]; West China; Indio-China[4]; Taiwan.

This form, as suggested by Maulik (1919, p. 328), is probably at best a subspecies of *A. amabilis* Boheman. The writer is inclined to the view that these two, together with *A. chandrika* Maulik, may eventually prove to be subspecies, or color forms, of *A. furcata* (Thunberg), in spite of the ease with which most of them may be keyed.

Aspidomorpha miliaris (Fabricius)

(Plate 28, figure 1; plate 36, figure 2)

Cassida miliaris FABRICIUS, 1775, Syst. Ent.: 91[1]; 1781, Spec. Ins., 1:111; 1787, Mant. Ins., 1:64; 1792, Ent. Syst., 1:300; 1801, Syst. Eleuth., 1:400 ("St. Helena"); OLIVIER, 1790, Enc. Meth., 5:385; 1808, Ent., 6:943; 97, pl. 2, fig. 25[2]; HERBST, 1799, Natursyst. Käf., 8:312, pl. 135, fig. 8*. (Type in British Museum.)

Cassida quatuordecimpunctata Olivier, 1808, Ent., 6:943; 97, pl. 4, fig. 66.

Aspidomorpha celebensis Blanchard, 1853, Voy. Pole Sud (d'Urville), 4:316, pl. 18, fig. 9[3]; Boheman, 1862, Mon. Cassid., 4:281.

Aspidomorpha miliaris, Boheman, 1854, Mon. Cassid., 2:261; Wollaston, 1877, Col. St. Helenae: 215 (St. Helena ?); Weise, 1896, Deutsche Ent. Zeits., 1896:16; Spaeth, 1903, Ann. Mus. Nat. Hung., 1:138; 1914, Col. Cat., 62:69; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 334, figs. 103–4[4]; Gressitt, 1938, Lingnan Sc. Jl., 17:189[5], 579[6]; 1939, Pan-Pac. Ent., 15:140[7].

Aspidomorpha amplissima Boheman, 1854, Mon. Cassid., 2:260[8]; Weise, 1896, Deutsche Ent. Zeits., 1896:16.

Aspidomorpha miliaris abb. *flaveola & inundata* Weise, 1910, Philip. Jl. Sc., D, 5:143[9].

Biology: Schultze, 1908, Philip. Jl. Sc., A, 3:264, pl. 2, pl. 3, figs. 1–4, pl. 6, figs. 6–9[10]; Bishop, 1909, Jl. Sts. Br. Roy. Asiat. Soc., 53:129.

Pale straw-yellow to ochraceous, rarely to pitchy-black; pronotum immaculate; elytra with extreme basal border and apex of suture black; each marked on explanate margins with a large oblique spot behind humerus and another in posterolateral portion, and on disc with one to ten spots of varying sizes, sometimes confluent, of black; ventral surfaces with only sides of metasternum black to entirely black; antennae with last three segments black to entirely pitchy black.

Very broad, nearly circular in outline, feebly convex. Prothorax about twice as broad as long, broadly rounded at sides, smooth; elytra nearly twice as broad as prothorax, rounded at humeri, broadest at end of basal third, where explanate margins are as broad as discs. Length 9.5–15 mm.; breadth 8.5–13.3 mm.

One (C.A.S.) Hong Kong, 1909, Dr. J. C. Thompson.

Hosts: *Calonyction bona-nox* Boyar, *Convolvulus* sp., *Ipomoea triloba* Linn., *I. pes-caprae* Linn., *I. Batatas* Lamk., *Gmelina arborea* (?).

China: Yunnan[3]; Hong Kong; Hainan Island[5,6] (Ta-hian, Tai-pin, Liamui, Hoihow, Nam-liu-tin, Kachek, Mau-ying-ts'uen, Nam-fung, Nodoa, Lin-fa Shan, Lok-kei, Yau-ma-woh). April to August (Hainan).

Distribution: India[2]; Andaman Islands[4]; Assam[5]; Burma[4]; Yunnan; Hainan Island; Indo-China[6]; Malaya; Sumatra[7]; Java[1]; Borneo; Celebes[3]; New Guinea; Philippine Islands[8,9,10].

Aspidomorpha sanctae-crucis (Fabricius)

(Plate 28, figure 3; plate 36, figure 3)

Cassida St. Crucis Fabricius, 1792, Ent. Syst., 4 (App.): 446[1]; 1801, Syst. Eleuth., 1:401; Illiger, 1808, Mag. Ins., 5:227*. (Type in Copenhagen University Museum.)

Cassida elevata Fabricius, 1801, Syst. Eleuth., 1:399[2].

Aspidomorpha sanctae-crucis, BOHEMAN, 1854, Mon. Cassid., 2:287, pl. 6, fig. B; SPAETH, 1914, Col. Cat., 62:69[3].

Aspidomorpha Heroina BOHEMAN, 1854, Mon. Cassid., 2:284 (no loc.).

Aspidomorpha limbipennis BOHEMAN, 1854, l.c.: 285; 1862, 4:266[4].

Aspidomorpha bajula BOHEMAN, 1854, op. cit., 2:288 ("America").

Aspidomorpha lobata BOHEMAN, 1854, l.c.: 289[5]; SPAETH, 1914, Deutsche Ent. Zeits., 1914:544* (Subsp. ?).

Aspidomorpha Stevensi BALY, 1863, Jl. Ent., 1:11[6] (Subsp. ?).

Aspidormorpha fraterna BALY, 1863, l.c.[7] (Subsp. ?).

Aspidomorpha Stae Crucis, BALY, 1863, l.c.: 13[8].

Aspidomorpha orientalis (Dejean ms.) GEMMINGER & HAROLD, 1872, Cat. Col., 12:3650[9].

Aspidomorpha St. crucis, WEISE, 1897, Deutsche Ent. Zeits., 1897:102[10].

Aspidomorpha insularis SPAETH, 1912, Sarawak Mus. Jl., 1:118[11].

Aspidomorpha sanctae-crucis, MAULIK, 1913, Rec. Ind. Mus., 1913:111; Fauna Brit. Ind., Hisp. & Cass.: 329[12], fig. 101; GRESSITT, 1938, Lingnan Sc. Jl., 17:189[13], 580[14]; 1939, Pan-Pac. Ent., 15:140[15].

BIOLOGY: WEISE, 1897, Deutsche Ent. Zeits., 1897:102; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 273, figs. 85–7.

Pronotal and elytral discs and two or four splotches on elytral explanate margins brilliant golden in life, testaceous to pitchy in dried specimens; explanate margins semitransparent and amber colored except inner lateral portions of elytral margins which are generally more transparent, or else brown to pitchy; ventral surfaces pale to pitchy; anntennae with last two segments black.

Nearly circular in outline; moderately convex with elytra raised to a pointed tubercle just behind scutellum. Prothorax nearly twice as broad as long, rounded laterally, smooth. Elytra nearly twice as broad as prothorax, rounded at humeri; discs conjointly tuberculate, rugulose and subseriate-punctate. Length 9.6–16 mm.; breadth 9.6–15 mm.

Some (A.M.N.H. and U.NK) Omei Shan, August 13, 1938, Yen-ping, Spring, 1915, and July, 1920, on roses; (Lingnan) Luichow Peninsula, August, 1950.

Hosts: *Ipomoea* sp., *Tectona* sp., *Michelia* sp. (?)

China: Yunnan (Tengyuen—Tali-Fu[12]); Hainan Island[13,14] (Nodoa, Ta-hian, Ta-han, Ta-hau, Dome Mountain, Vo-lau, Fan-ta, Cheung-kon, Liamui, Tai-pin, Tai-tsing-lam-ts'uen, Lok-kei, Nam-fung, Ch'ung-mei, Nai-suen, Kom-yan, Five Finger Mountains); Kwangtung (Lien, Yang-shan[14], Luichow Peninsula); Fukien (Yen-ping); Szechuan (Omei Shan). March to November (Hainan).

Distribution: India[5]; Ceylon[4]; Assam[12]; Burma[10]; South China; Hainan; Indo-China[6,7,8]; Thailand[8,11]; Malaya, Sunda Islands[1,2,3,9,11,15].

Aspidomorpha transparipennis (Motschulsky)

Coptocycla transparipennis Motschulsky, 1860, Etud. Ent., 9:41[1]. (Type in Moscow Museum ?.)

Aspidomorpha transparipennis, Kraatz, 1879, Deutsche Ent. Zeits., 23:142; Weise, 1900, Arch. f. Naturg., 66 (1):295[2]; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64:(129[3]); Matsumura, 1931, Nippon Konchu Daizukan: 226, fig. 620[4]; Chujo, 1934, Sylvia, 5:151; Spaeth, 1942, Arb. morphol. taxon. Ent. Berlin-Dahlem, 9:12 (Erzendjanzsy).

Aspidomorpha elliptica Gorham, 1885, Proc. Zool. Soc. London, 1885, 280[5].

Aspidomorpha transparipennis ab. *elliptica* Chujo, 1934, Sylvia, 5:151.

Aspidomorpha transparipennis var. *vetula* Weise, 1900, Arch. f. Naturg., 66, 1:295[6].

Pronotal disc pale testaceous to amber; explanate margins pale hyaline, transparent, those of elytra with a dark reddish brown patch at humerus and another on posterolateral portion; elytral discs transparent pale testaceous to dark pitchy red-brown with a small pale spot behind scutellum; ventral surfaces and legs pale with last two or three segments slightly darkened.

Dorsal outline oblong-oval; feebly convex; elytra hardly raised at suture behind scutellum. Pronotum subsemicircular, slightly convex basally; disc smooth. Elytra slightly broader than prothorax; humeri briefly rounded, hardly projecting; discs very finely seriate-punctate. Length 6.3–7 mm.; breadth 4.7–5 mm.

Host: *Chenopodium* (?).

China: Manchuria (Erzendjanzsy).

Distribution: Japan (Hokkaido[4]; Honshu [2,5,6]); Korea[3]; Amur[1]; North China.

Genus **Sindia** Weise

Sindia Weise, 1897, Deutsche Ent. Zeits., 1897:105; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 340.

Head with outline circular in anterior view, swollen and subtuberculate just inferior to antennal insertions; eyes large, elliptical. Antennae barely reaching to humeral angles; basal six segments subcylindrical, slightly thickened distally, glabrous, distal segments thicker, more cylindrical, hairy. Prothorax much broader than long; explanate margins completely covering head, nearly one-fourth as broad as pronotal disc. Elytra slightly broader than prothorax, subparallel-sided; explanate margins about one-fourth as wide as a single elytral disc. Prosternum flat, broadly rounded posteriorly. Tarsi moderately broad; claws projecting beyond third segment, bearing combs on inner faces.

Generotype: *Cassida clathrata* Fabricius (India).

Range: India; China.

Sindia sedecimmaculata (Boheman)

Cassida sedecimmaculata BOHEMAN, 1856, Cat. Col. Ins. Brit. Mus., 9:119[1]; 1862, Mon. Cassid., 4:290. (Type in Stockholm Museum.)

Aspidomorpha sedecimmaculata, GEMMINGER & HAROLD, 1874, Cat. Col., 12:3651.

Sindia sedecimmaculata, SPAETH, 1901, Verh. Zool.-Bot. Ges. Wien, 51:347[2]; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 343[3]; CHEN, 1935, Sinensia, 6:780, fig. 7[4].

Orange-brown with black spots in life. Dried specimens with dorsal surfaces pale ochraceous: pronotum with a large black spot on each side of disc; elytra with a common transverse oval spot behind scutellum, and six other subrounded black spots on each; including sutural spot, arranged in three oblique rows on each elytron, three spots in second row and first spot each of second and third rows touching border of explanate margin; latter not very transparent; antennae, legs and ventral surfaces ochraceous with central portions of metasternum and abdominal segments black.

Body oblong-oval in dorsal outline, moderately convex, highest behind middle. Pronotum nearly twice as broad as long, feebly punctured on disc. Elytra with humeri rounded, not very prominent, discs in large part subseriately punctured and explanate margins somewhat declivitous. Length 7 mm., breadth 5 mm.

China: Kweichow[4].

Distribution: Eastern India[1,2] (Sikkim[3]); Southwestern China.

Genus **Sindiola** Spaeth

Sindiola SPAETH, 1903, Ent. Tidskr., 1:112; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 344; SPAETH, 1932, Rev. Zool. Bot. Afr., 22:227; 1938, Ent. Tidskr., 59:231.

Head subrounded, oblique; frontoclypeus raised above, emarginate below. Antennae reaching humeri, hardly thickened distally; third segment long. Prothorax transversely elliptical, bluntly rounded at each side. Elytra sculptured, reticulate, raised on suture behind scutellum, slightly narrowed posteriorly to parallel-sided. Prosternum broad and rounded posteriorly. Tarsi broad; claws with long distinct oblique teeth on each side (comblike structure).

Maulik gives the parallel-sided body form, and the humeral angles of the elytra, as important characters of the genus, besides the claw character, but the following species and others more recently included by Spaeth are much more like *Laccoptera* in these two former characters.

Generotype: *Aspidomorpha (Sindiola) parallelipennis* Spaeth.

Range: Southeastern Asia.

Sindiola hospita (Boheman)

(Plate 27, figure 5)

Laccoptena hospita Boheman, 1855, Mon. Cassid., 3:68[1]. (Type in Stockholm Museum ?.)

Laccoptera vigintisexnotata subsp. *puncticolle* Gressitt, 1938, Lingnan Sc. Jl., 17:189[2], 582[3]; new synonym. (Type in U.S.N.M.)

Sindiola hospita, Spaeth, 1938, Ent. Tidskr., 59:232[4].

Dorsal surfaces testaceous transparent, marked with black; pronotum with six rounded spots forming a transverse ellipse on disc, two posterior spots largest; elytra with a common spot on tubercle and each with an oblique broken band behind humerus, a large posterolateral spot partly on disc and partly on explanate margin, and several small spots, mostly on base and parallel to suture; ventral surfaces testaceous.

Dorsal outline rounded-triangular, subpentagonal; body rather strongly convex. Pronotum one-half again as broad as long, elliptical, broadly rounded laterally; disc slightly uneven, feebly punctured. Elytra distinctly tuberculate behind scutellum, deeply seriate-punctate, alternate interspaces more strongly raised; explanate margins grossly punctured. Length 8.7–9.2 mm.; breadth 6.6–7.3 mm.

Several (M.C.Z.) Kwei-shien and Kwei-ping, April, 1933, and Yung-shien, 1933, Gaines Liu.

China: Hainan (Ta-han, Ta-han[2], Lung-hou, Kachek, Lok-kei, Nam-fung, Hau-ying[3], Nodoa); Kwangsi (Yung-shein, Kwei-shien, Kwei-ping); Szechuan[4]. April to August.

Distribution: Hainan Island; South China; Indo-China[1] (Annam[4]).

Genus **Laccoptera** Boheman

Laccoptera Boheman, 1855, Mon. Cassid., 3:55; Chapuis, 1875, Gen. Col., 11:408; Weise, 1897, Deutsche Ent. Zeits., 1897:205; 1899, Arch. f. Naturg., 65, 1:246; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 346.

Head rounded-oval in anterior outline, strongly oblique in transverse outline, nearly horizontal below; frontoclypeus raised, campanuliform. Antennae extending beyond humeri, slightly thickened distally; segments subcylindrical, third longer than scape. Prothorax transverse, covering head, not grooved at sides for reception of antennae. Elytra rough, broader than prothorax, conjointly subtriangular or trapezoidal in dorsal outline, raised on suture behind scutellum; explanate margins fairly broad anteriorly, moderately declivitous. Prosternum broad and rounded posteriorly. Tarsi moderately wide; claws barely extending beyond third segment, each having an internal comb, and at least a slight suggestion of an external comb.

Generotype: *Laccoptera excavata* Boheman (South Africa).

Range: Ethiopian and Oriental regions.

KEY TO THE CHINESE SPECIES OF LACCOPTERA

1. Body more or less triangular, strongly narrowed posteriorly and strongly swollen dorsally 2

— Body more rounded, not triangular, feebly narrowed posteriorly, one-half again as long as broad, moderately swollen dorsally and non-tuberculate; pronotum coarsely rugulose ..... *L. yunnanica*

2.(1) Dorsal surfaces of body generally with less than 13 distinct spots; pronotum with small round spot on each side of disc; elytral margins with dark patches behind humeri and in posterolateral portions ..... *L. quadrimaculata*

— Dorsal surface of body with 13 black spots; pronotum usually immaculate; explanate margins of elytra lacking dark patches; metasternum only slightly pitchy ..... *L. tredecimpunctata*

Laccoptera quadrimaculata (Thunberg)

(Plate 35, plate 36, figures 5 and 8)

Laccoptera quadrimaculata THUNBERG, 1789, Nov. Ins. Spec., 5:86, pl. 5, fig. 94[1]. (Type in Upsala University Museum.)

Laccoptera chinensis BOHEMAN *(not* Fabricius), 1855, Mon. Cassid., 3:71[2]; HOFFMANN, 1933, Lingnan Sc. Jl., 12:259, pl. 16.

Laccoptera quadrimaculata subsp. *Bohemani* WEISE, 1910, Verh. Naturf. Ver. Brünn, 48:42[3]; SPAETH, 1913, Ann. Mus. Nat. Hung., 11:46[4]; 1914, Col. Cat., 62:82[5] 1914, Suppl. Ent., 3:15[6]; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 347, fig. 110[7]; SPAETH, 1926, Best.-Tab. Eur. Col., 95:9; CHUJO, 1934, Sylvia, 5:153[8]; GRESSITT, 1938, Lingnan Sc. Jl., 17:191[9], 384[10], 581[11]; 1939, Pan-Pac. Ent., 15:140[12].

Laccoptera Bohemani, SPAETH, 1914, Ent. Mitt., 3:226; 1914, Suppl. Ent., 3:15.

Laccoptera Thunbergi SPAETH, 1914, Suppl. Ent., 3:15 (new name).

BIOLOGY: KERSHAW & MUIR, 1907, Trans. Ent. Soc. London, 1907:290; HOFFMANN, 1933, Lingnan Sc. Jl., 12:259, pl. 16.

Dorsal surfaces testaceous to somewhat reddish, marked with black; pronotum with a small spot on each side of disc some distance from center; elytra each with a spot on anterior portion of common tubercle, an incomplete oblique lateral stripe behind humerus fading out before reaching border of explanate margin, two spots, one behind the other, near center of disc, a large posterolateral spot on explanate margin, one or two spots near top of posterior declivity, and suture black apically; sometimes more extensively marked with black; metasternum black.

Body rounded-triangular in dorsal outline. Pronotum nearly twice as broad as long, deeply striate on disc, irregular on explanate margins. Elytra with disc heavily striate-punctate, with alternate interspaces more strongly raised and joined in places by transverse or oblique ridges. Length 7–9 mm.; breadth 6.6–7.6 mm.

Some (U.S.N.M.) Suifu, 1,000 feet, September, 1924, May, 1928, Tsang-hin-shien, 1,200 feet, south of Suifu, May 7, 1924, Yachow, 2,000 feet, July, 1928, and Ning-yuen-fu, 6,000 feet, August 4, 1928, D. C. Graham; (M.C.Z.)

Kiangsu; Yingshien, 1933, Kingloo Shan, August, 1932; Gaines Liu; (C.A.S.) Riran, Formosa, April 19, 1932, Gressitt; (Lingnan) Shaowu, Wingan, March-October, Maa.

Hosts: *Ipomoea Batatas* Lamk., *I. purpurea* Roth.

China: Chekiang[12] (Hangchow); Fukien[10,11] (Foochow, Yen-ping, Kienyang, Shaowu, Wingan); Kwangtung[10,11] (Canton: White Cloud Mountain, Tsin-leung Shan, Yim-na Shan, Yao Shan, Ts'ing-yuen) Kwangsi (Lungchow[11]); Sikang (Yachow); Szechuan (Suifu, Ning-yuen-fu); Hainan Island[9,11] (Kachek, Ngai-chau, Nam-fung, Cheung-kon, Tai-pin, Lai-mo-ling, Tai-tsing-lam, Lunghou to Lung-tong, Lok-kei, Ts'ung-to, Hau-ying-ts'uen, Ta-hian, Ta-hau, Liamui, Nodoa); Taiwan[4,6,8] (many localities). Year-round at Canton.

Distribution: South China[2,3]; Taiwan; Indo-China[6,11,12]; Burma[6]; India[7]; East Indies[5]; Andamans[5].

Since the type specimen of *L. quadrimaculata* came from China, and since material from all over South China, as well as neighboring areas, seems to vary within similar limits, the writer sees no justification for the continued use of the subspecific name "*bohemani.*"

Laccoptera tredecimpunctata (Fabricius)

Cassida miliaris Herbst *(not* Fabricius), 1799, Natursyst. Käf., 8:312, pl. 135, fig. 8.

Cassida 13-punctata Fabricius, 1801, Syst. Eleuth., 1:398[1]. (Type in Copenhagen Museum.)

Aspidomorpha philippinensis Blanchard, 1853, Voy. Pole Sud (d'Urville), 4:321, pl. 18, fig. 14[2].

Laccoptera tredecimpunctata, Boheman, 1855, Mon. Cassid., 3:73; Baly, 1863, Jl. Ent., 1:14[3]; Spaeth, 1914, Col. Cat., 62:83[4]; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 350, fig. 112[5]; Gressitt, 1938, Lingnan Sc. Jl., 17:582[6].

Laccoptera 13-punctata, Weise, 1905, Deutsche Ent. Zeits., 1905:123[7].

Reddish brown; pronotum with a pair of round black spots on disc; elytra with five rounded black spots arranged in a zig-zag on disc of each and a common black spot on raised area behind scutellum; ventral surfaces reddish ochraceous marked with blackish on each side of metasternum; antennae pitchy on three distal segments.

Body subtriangular in dorsal outline, rounded posteriorly; fairly convex, gradually declivitous anteriorly and steeply declivitous posteriorly. Prothorax transversely subelliptical, evenly convex anteriorly, sinuately convex posteriorly, rounded at lateral angles; disc finely punctured, sublongitudinally sculptured on central portion. Elytra distinctly broader than prothorax; humeri rounded, fairly prominent; discs densely seriate-punctate, the punctures wider than interspaces, both longitudinally and transversely, except for first, second and fourth interspaces from suture, which are raised;

explanate margins coarsely subrugose-punctate. Length 7 mm.; breadth 5.8 mm.

One (C.A.S.) Hong Kong, 1909, J. C. Thompson.

China: Hainan Island[6]; Hong Kong.

Distribution: India[5]; Thailand[3]; Hainan; Hong Kong; Sunda Islands[1,4]; Philippine Islands[2].

Laccoptera yunnanica Spaeth

Laccoptera yunnanica SPAETH, 1914, Ent. Mitt., 3:226[1]. (Type in Spaeth Collection, Manchester.)

Moderately shiny, brilliant rusty red; dorsum unicolorous or with a pitchy or black spot on explanate margin of each elytron behind middle, or elytral apices also broadly black, or explanate margins with a dark spot behind each humeral angle, and elytral ridges sometimes partly marked with black; metasternum with a pitchy black transverse mark; abdomen with an indistinct black ring mark; antennae with five distal segments pitchy black.

Form weakly subtriangular, broadest just behind humeri, only moderately narrowed posteriorly; about one-half again as long as broad; moderately convex, without tubercles. Prothorax coarsely vermiculate-rugose, with a sub-basal transverse impression extending outward obliquely at each side, behind which base is longitudinally wrinkled; disc strongly swollen anteriorly. Elytra with humeri rounded, much broader than prothorax; explanate margins fairly narrow, moderately declivitous; discs coarsely, deeply and subregularly punctured; second interspace of each elytron raised like a keel and connected by a transverse smooth keel at summit, a similar, weaker keel running externally; explanate margins less coarsely punctured than discs. Tarsal claws smooth externally, with five teeth internally; antennae exceeding angles of prothorax. Length 7–7.5 mm.; breadth 6–6.5.

China: Yunnan[1].

Distribution: Southwest China.

Tribe CASSIDINI

Cassidini of authors.

Pronotum not obviously emarginate anteriorly. Tarsal claws never bearing series of comblike teeth on their sides. Prosternum sometimes grooved at sides for reception of antennae.

Genus Thlaspida Weise

Thlaspida WEISE, 1899, Arch. f. Naturg., 65, 1:272; SPAETH, 1914, Suppl. Ent., 3:16; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 428; SPAETH, 1926, Best.-Tab. Eur. Col., 95:62.

Body strongly convex and rough, bluntly tuberculate behind scutellum; dorsal outline rounded-hexagonal. Head with clypeofrontal area triangular,

longer than broad, slightly swollen below antennal insertions. Antennae slender, cylindrical, reaching beyond humeral angles. Prothorax broader than long, much narrower than elytra, subrounded at sides, more strongly convex posteriorly than anteriorly; disc smooth and impunctate. Elytra broadest a short distance behind humeri, which are subangulate; discs strongly and obtusely raised at suture a short distance behind scutellum, surface of each deeply and subseriately punctured and crossed by some irregular subtransverse ridges; explanate margins fairly broad, fully one-half as wide as discs; epipleura of posterior borders of explanate margins bearing extremely fine, posteriorly directed, pale hairs. Tarsi moderately broad; claws just projecting beyond end of third segment, distinctly toothed basally.

Generotype: *Coptocycla cribrosa* Boheman (India; Siam).

Range: India; East Asia.

Key to the Chinese Species of Thlaspida

1. Explanate margins of elytra marked with a dark spot only behind middle, or entirely pale; pronotal disc not depressed anteriorly 2

— Explanate margins of elytra marked with dark spots both near humeri and behind middle; pronotal disc very feebly convex anteriorly; explanate margins at apices distinctly less than one-half as wide as greatest width at sides; discs reddish testaceous to partly pitchy ..... *T. lewisi*

2.(1) Explanate margins at apices about one-half as wide as greatest width at sides; lateral angles of pronotum placed distinctly anterior to median transverse line; discs usually partly pitchy 3

— Explanate margins at apices less than one-half as wide as greatest width at sides; lateral angles of pronotum placed very near median transverse line; discs often nearly unicolorous; posterolateral dark patches on explanate margins often lacking; elytral borders evenly rounded posterolaterally ..... *T. formosae*

3.(2) Elytral borders with distinct obtuse angles posterolaterally, nearly parallel-sided in central portion; explanate margins at apices no more than one-half as wide as greatest width at sides; sides of disc generally reddish brown ..... *T. biramosa japonica*

— Elytral borders rounded or with very feebly obtuse angles posterolaterally, narrowed posteriorly from anterior to middle of sides; explanate margins at apices often distinctly more than one-half as wide as greatest width at sides; lateral portions of disc often pitchy ..... *T. biramosa chinensis*

Thlaspida biramosa chinensis Spaeth

(Plate 28, figure 9)

Thlaspida chinensis Spaeth, 1926, Best.-Tab. Eur. Col., 95:64[1]. (Type in Spaeth collection.)

Thlaspida japonica Gressitt *(not* Spaeth), 1938, Lingnan Sc. Jl., 17:191[2], 385[3], 583[4]; 1939, Pan-Pac. Ent., 15:141[5] (part).

Dorsal surfaces generally highly transparent, hyaline on explanate margins, except for posterolateral brown patch, testaceous, reddish brown or pitchy black on discs, generally darker at sides and pale on median portion behind dorsal tubercle; ventral surfaces pitchy black to largely reddish brown; antennae with distal half pitchy black.

Pronotum not quite twice as broad as long, rounded obtuse at lateral angles, which are placed slightly anterior to middle. Elytra three-fifths again as broad as pronotum, about as broad as long; suture strongly raised between scutellum and tubercle, making latter very obtuse in lateral outline; disc of each elytron with five or six subtransverse connecting ridges; humeri bluntly rounded, bent distinctly inward toward pronotal angles. Length 6.7–10 mm.; breadth 5.5–8.5 mm.

Several (Lingnan and C.A.S.) Shaowu, Chang-ting, Kien-yang, Chungan, April to October, T. C. Maa.

China: Szechuan[1] (Kuanhsien[5]); Kweichow[1]; Hunan (Lam-mo[4]); Kwangtung (Yao Shan, Lien District[4]); Hainan Island[2,4] (Ta-hian, Ta-hau, Ta-han, Cheung-kon, Sam-kwong, Lam-wan-tung, Hau-ying, Tai-po, Tai-tsing-lam); Fukien (near Shanghang[3], Shaowu, Chang-ting, Kien-yang, Chungan). April to October.

Distribution: South and West China; Hainan Island; Indo-China[1].

Thlaspida biramosa japonica Spaeth

? Coptocycla biramosa var. *a* Boheman, 1862, Mon. Cassid., 4:464[1].

Coptocycla biramosa, Kraatz, 1879, Deuts. Ent. Zeits., 23:272[2]; Gorham, 1885, Proc. Zool. Soc. London, 1885:283[3].

Thlaspida biramosa, Weise, 1899, Arch. f. Naturg., 65, 1:273[4].

Thlaspida japonica Spaeth, 1914, Suppl. Ent., 3:17[5]; 1914, Col. Cat., 62:127; 1926, Best.-Tab. Eur. Col., 95:63; Yokoyama, 1931, (Col. Japan), 2:18, pl. 3, fig. 1; Yuasa, 1932, Nippon Konchu Zukan: 585, fig. 144; Chujo, 1934, Sylvia, 5:155; Gressitt, 1939, Pan-Pac. Ent., 15:141[6] (except Szechuan). (Type in Spaeth collection, if designated.)

Dorsal surfaces yellowish brown to dark reddish brown: pronotum with disc reddish brown, paler anteriorly, and explanate margins hyaline, subtransparent; elytra dark reddish brown at sides and on anterior portion of dorsal tubercle, reddish on humeral callus and yellow on central portions and transverse ridges; ventral surfaces black, pale along lateral borders; legs and antennae pale, latter with distal halves dusky.

Pronotum less than twice as broad as long, rounded-angulate laterally with lateral angles distinctly anterior to middle. Elytra subparallel at sides, narrowed at humeri and behind posterolateral dark patches, distinctly longer than broad: transverse ridges of discs strongly raised; dorsal tubercle

very obtuse; humeral angles bent slightly outward at apices. Length 6.6–8.6 mm.; breadth 5.7–7 mm.

Several (M.C.Z.) Nagasaki and Satsuma, Kyushu, May, 1886, Leech; Nikko, Honshu, August, 1886, G. Smith; and Tai-ping-shien, Anhwei, October, 1932, G. Liu; (C.A.S.) Mt. Takao, Honshu, May 4, 1930, Gressitt.

Host: *Callicarpa japonica* Thunberg (Japan).

China: N. China[5]; Kiangsu (Chinkiang[4]); Chekiang (Hangchow, Mokan Shan[6]); Anhwei (Tai-pin-shien); "China"[1]. May to August.

Distribution: Japan[2,5] (Honshu; Kyushu[3]); northeast China.

After studying numerous series of this complex, the writer is inclined to the conclusion that a widely distributed, highly variable species is concerned, and that until the forms are well known throughout their range, it is not safe to call even specimens from Japan a different species from those inhabiting Sumatra. Within a given area specimens vary greatly, and lines between races may prove very difficult to establish.

Thlaspida formosae Spaeth

Thlaspida formosae Spaeth, 1913, Ann. Mus. Nat. Hung., 11:46[1]; 1914, Suppl. Ent., 3:16[2]; Chujo, 1934, Sylvia, 5:157[3]. (Type in Budapest Museum.)

Thlaspida formosae ab. *immaculatipennis* Chujo, 1934, Sylvia, 5:157[4].

Dorsal surfaces partly reddish brown on discs with a large posterolateral dark brown spot on explanate margins of elytra, or entirely orange testaceous with a slight pitchy spot on dorsal tubercle and explanate margins entirely sulphurous hyaline, without dark spots; ventral surfaces reddish brown with metasternum black; legs and antennae pale, latter slightly darkened in distal halves.

Pronotum five-ninths as broad as long, distinctly convex on anterior margin; lateral angles narrowly rounded, placed very near middle in longitudinal sense. Elytra with borders subevenly rounded, giving body a subcircular outline, except for slightly prominent humeral angles; dorsal tubercle large, obtuse; discs with several prominent transverse ridges, giving a partially reticulated arrangement; explanate margins less than twice as broad near apices as at middle of sides.

Some (C.A.S.) Kuraru, near Koshun, August 12–13, 1934, Gressitt.

Hosts: *Callicarpa formosana* Rolfe, *Ipomoea Batatas* Lamk.

China: Taiwan[1,2,3,4] (Kankau, Kuraru, Hokuto, Fuhosho, Takao, etc.).

Distribution: Taiwan.

It is possible that the forms in northern and southern Taiwan may represent different subspecies, in which case Chujo's name "*immaculatipennis,*" although based on a color character, would be available for the latter.

Thlaspida lewisii (Baly)

(Plate 28, figure 8)

Coptocycla Lewisii BALY, 1874, Trans. Ent. Soc. London, 1874:214[1]; GORHAM, 1885, Proc. Zool. Soc. London, 1885:283[2]. (Type in British Museum.)

Coptocycla testacea RYBAKOW, 1884, Hor. Soc. Ent. Ross., 18:136[3].

Thlaspida testacea, SPAETH, 1914, Suppl. Ent., 3:16[4].

Thlaspida Lewisi, SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.):(145)[5]; DOI, 1927, Dobutsug. Zasshi, 39:337[6]; CHUJO, 1934, Sylvia, 5:155.

Dorsal surfaces brownish and yellowish, marked on explanate margins of each elytron with two large dark spots: one near humerus, other behind middle; elytral discs pitchy brown, darker externally, with ridges yellowish; ventral surfaces pitchy: legs yellowish; explanate margins highly transparent.

Pronotum twice as long as broad, subtriangular, obtusely angulate anteriorly; sides rounded, lateral angles behind middle, in longitudinal sense. Elytra much broader than pronotum, subevenly rounded along margins; humeri rounded, moderately prominent; discs distinctly tuberculate behind scutellum, concave on each side of scutellum, deeply punctate-striate; interspaces raised, particularly near suture in posterior half, crossed by several loosely reticulated subtransverse ridges. Length 7–8 mm.; breadth 7–7.5 mm.

One (Heude) Hsiaoling; (Lingnan) Bohea Hills, April 30, 1940, T. Maa (F. 7741).

China: Manchuria (Hsiaoling); Fukien (Bohea Hills).

Distribution: Amur[4]; Ussuri[3]; East China; Korea[5,6]; Japan (Honshu[1,2]; Hokkaido[2]).

Genus Glyphocassis Spaeth

Glyphocassis SPAETH, 1914, Deutsche Ent. Zeits., 1914:547; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 359.

Hebdomecosta SPAETH, 1915, Wien. Ent. Ztg., 34:361 (type *H. reitteri)*; new synonymy.

Head very strongly oblique, nearly horizontal in front, its outline subrounded in anterior view; frontal area triangular, swollen posterior to antennal insertions, obliquely grooved on each side. Antennae reaching slightly beyond humeri; fairly slender and glabrous in basal half; five distal segments thickened, subcylindrical and hairy. Prothorax transversely oval, broadly rounded laterally; disc even; explanate margins moderately wide and subhorizontal. Elytra rather strongly and evenly convex, seriate-punctate, with relatively narrow and strongly declivitous explanate margins. Prosternal process concave in center, broadly rounded posteriorly; sides of

prothorax grooved for reception of antennae. Tarsi fairly slender; claws extending beyond third segment, slender and simple, or somewhat toothed.

Generotype: *Cassida trilineata* Hope (Nepal; Sikkim; Tonkin).

Range: Northern India; South China; Japan. The range of *Glyphocassis* as shown on map 2 should be extended over to southern Japan.

This genus, as augmented, contains four forms, three of them in China. There seems to be no very good reason for maintaining *Glyphocassis* and *Hebdomecosta* as separate genera. The character of the tarsal claws toothed versus untoothed is not alone sufficient to separate otherwise apparently perfectly congeneric species. Furthermore, the claws have at least a suggestion of teeth in *G. lepida.*

Key to the Chinese Species of Glyphocassis

1. Elytra rather strongly convex; body more than two-fifths as deep as long, broadly ovate; pronotal disc largely pale 2
— Elytra not strongly convex; body less than two-fifths as deep as long, suboblong and subparallel-sided; pronotal disc largely black ..... *G. trilineata szechuana*
2. Pronotum obtusely arcuate anteriorly; pronotum finely punctulate with three feeble basal black markings; each elytron with suture narrowly and evenly black and with only one or two very small discal spots ..... *G. lepida*
— Pronotum evenly arcuate anteriorly; pronotum with very minute punctures, with three large basal black markings; each elytron with suture edged with a series of black spots and with three large oblique black discal markings ..... *G. spilota*

Glyphocassis lepida (Spaeth), new combination

(Plate 29, figure 8)

Coptocyla lepida Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64:(145)[1]. (Type in Spaeth collection, Manchester.)

Hebdomecosta lepida, Spaeth, 1915, Wien. Ent. Ztg., 34:363.

Glyphocassis tetrasticta Gressitt, 1942, Lingnan Nat. Hist. Surv. & Mus. Spec. Publ., 5:3, fig. 3[2]; new synonymy. (Type in W.C.U.U.)

Dorsal surfaces reddish brown, a large black spot near each posterolateral angle of pronotum, a short longitudinal line anterior to scutellum, and scutellum, black, each elytron with suture, basal margin, a small line on base of fourth puncture-row, a median line external to fourth puncture-row, and an oblique spot behind middle of explanate margin, of black; ventral surfaces black with outer margins of abdominal segments dark rust-red; head brownish red; legs reddish with bases of femora pitchy black; antennae brownish red.

Ovate, one-half again as long as broad, hardly widened at sides, strongly swollen, non-tuberculate. Head with frons triangular, narrowed at antennal insertions. Antennae with ninth segment reaching base of prothorax, six

basal segments slender and shiny, the remainder thicker, hairy. Prothorax transversely elliptical, with sides broadly rounded, widest at middle, swollen and microscopically punctulate on disc. Elytra one-sixth broader at base than prothorax, with humeri prominent, disc of each with ten rows of fine, deep punctures, the rows narrower than the smooth interstices; explanate margins declivitous, vaguely punctured; claws untoothed. Length 4.7 mm.; breadth 3.5 mm.

Specimens (M.C.Z.) Chang-yang, altitude 4–6,000 feet, near Ichang, July 1887, and Kiukiang, June 1887, A. E. Pratt; (U.S.N.M.) Hua-yin Shan, 2,500 feet, 70 miles north of Chungking, July 5, 1933, D. C. Graham.

China: Sikang (Lingkuan[2]); Szechuan (Chungking[1], Hua-yin Shan) Kiangsi (Kiukiang); Hupeh (Chang-yang).

Distribution: South China.

Glyphocassis spilota (Gorham), new combination

Coptocycla spilota Gorham, 1885, Proc. Zool. Soc. London, 1885:285[1]; Spaeth, 1926, Best.-Tab. Eur. Col., 95:66. (Type in British Museum.)

Hebdomecosta reitteri Spaeth, 1915, Wien. Ent. Ztg., 34:362[2]; Gressitt, 1939, Pan-Pac. Ent., 15:143[3]. (Type in Spaeth collection, Manchester.)

Metriona spilota, Chujo, 1934, Sylvia, 5:159.

? Glyphocassis trilineata Liu *(not* Hope ?), 1936, Lingnan Sc. Jl., 15:261[4].

Hebdomecosta spilota, Spaeth, 1942, Arb. Morph. Tax. Ent. Berlin, 9:12.

Rich reddish castaneous with explanate margins ochraceous, marked with black as follows: pronotum with posterolateral angles, an adjacent spot on middle of each side of basal margin, touching the former, a broad median stripe from center of disc to scutellum, and a triangular spot above head, scutellum black, elytra with suture, some small irregular adjacent spots, three oblique spots on each disc and two marginal spots on each, one behind humeri, other behind middle; antennae, head and legs ochraceous; ventral surfaces black except for prothoracic pleura and borders of abdomen.

Small, rounded-oval, strongly convex. Antennae distinctly thickened distally, reaching to just beyond elytral humeri; frons convex, rough and punctured; prothorax about twice as broad as long, rounded anteriorly and laterally, sinuate basally, produced opposite scutellum, smooth though shallowly punctured on disc; scutellum short, triangular; elytra strongly convex, with explanate margins steeply declivitous anteriorly, broadest near middle, not very prominent at humeri, which are rounded and only slightly broader than prothorax; discs fairly smooth and even, shallowly and subregularly punctured. Length 4.6 mm.; breadth 3.75 mm.

One (Heude) Zikawei, April 28, 1917; many (Lingnan & C.A.S.) Ta-chu-lan, Shaowu, April to June, 1942–43, T. Maa; Kuatun, May, Klapperich.

China: Shantung ? ("Kiautschau"[2]); Kiangsu[4] (Shanghai); Chekiang (Hangchow[3]); Fukien (Shaowu, Kuatun).

Distribution: Eastern China; Japan (Honshu[1]).

Glyphocassis trilineata szechuana Gressitt, new subspecies
(Plate 28, figure 7)

Body reddish ochraceous, extensively marked with black: head pitchy reddish; antenna ochraceous on basal half, blackish distally; pronotum with explanate margin amber-colored with a broad pitchy black area just anterior to each posterolateral angle, and disc blackish with each side, and a round spot on either side of midline behind center, dull reddish; scutellum black; each elytron with explanate margin ochraceous amber with an incomplete pitchy spot on humeral portion and a larger black spot on posterolateral portion, and with disc black with spots of reddish ochraceous: three basal, of which humeral and middle one minute, two obliquely placed, anterior to middle, the hinder one larger and not far from suture, two more obliquely placed behind middle, subequal, the hinder one close to suture, and finally parts of extreme apex, and a small indentation on middle of side of disc, also pale; ventral surfaces pitchy black with outer borders of abdomen reddish; legs pitchy tinged with reddish.

Head round; frons trapeziform, convex, deeply punctured, obliquely grooved on each side. Antenna reaching slightly beyond humeral angle of elytron, slender basally, thickened distally; third to fifth segments subequal, each much longer than second; eighth to tenth each about as broad as long. Prothorax about twice as broad as long, evenly rounded anteriorly; disc convex and impunctate. Elytra about one-sixth broader than prothorax, subparallel-sided; disc of each subevenly convex, with ten rows of punctures, the punctures mostly fine and not very closely spaced; but in part larger in middle rows anterior to center, and on sides. Ventral surfaces striate on prosternum and metasternum, closely punctulate on metepisternum and sparsely punctured on abdomen. Tarsal claws moderately toothed. Length 5.5 mm.; breadth 4 mm.

Holotype (Lingnan Nat. Hist. Mus.) **Pe-pei, North of Chungking, eastern Szechuan Province, West China,** July 29, 1940, Gressitt, on sweet-potato; paratopotype (C.A.S.), July 27.

Differs from *G. trilineata* (Hope), of northern India, in having the pronotum more convex with its sides more steeply declivitous and with the black pigmentation more extensive, extending forward in a point above head and with a large marginal spot on each side, and with the elytra less evenly convex, with a depression on each side anterior to middle, more strongly punctured, and with a fairly large humeral spot on each explanate margin.

Distribution: West China.

Genus **Ischyronota** Weise

Ischyronota Weise, 1893, Naturg. Ins. Deutschl., 6:1069; Reitter, 1901, Wien. Ent. Ztg., 20:103; Jacobson, 1901, l. c.: 125.

Form very strongly convex, with explanate margins strongly declivitous; body narrowed posteriorly. Antennae hardly reaching beyond posterior margin of prothorax; second and third segments subequal in length. Pronotum subtriangular, subtruncate basally, narrowed anteriorly, truncate or briefly rounded apically. Elytra strongly convex; explanate margins steeply declivitous, separated from discs by an impressed line; discs irregularly punctured. Tarsi moderately broad; claws somewhat projecting beyond lobes of third segment, lacking basal teeth.

Generotype: *Cassida desertorum* Gebler (central Asia).

Range: Southeast Europe; central Asia.

Key to the Chinese Species of Ischyronota

1. Prothorax almost longer than broad; length of body 5 mm.....*I. conicicollis*
— Prothorax distinctly broader than long; dorsal surfaces of body partly rose-red; length 4–5.5 mm.....*I. desertorum*

Ischyronota conicicollis (Weise)

Cassida conicicollis Weise, 1890, Horae Soc. Ent. Ross., 24:487[1]. (Type in Moscow Museum ?)

Ischyronota conicicollis, Reitter, 1901, Wien. Ent. Ztg., 20:108; Jacobson, 1901, t. c.: 127; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.):144[2].

Dorsal surfaces green, slightly shiny; ventral surfaces brownish yellow; legs green.

Body slender, subovate; strongly convex; occiput smooth or with isolated punctures; prothorax as long as broad, trapeziform, strongly narrowed anteriorly, with large, shallow punctures; elytra more than one-half again as long as broad, narrowed behind the prominent humeri, either with regular rows of deep punctures or with confused puncture-rows. Length 5 mm.

China: Central Mongolia (Gobi Desert[1]); Sinkiang (Kuldja, Tien Shan[2]). August.

Distribution: Transcaspia to Mongolia.

Ischyronota desertorum (Gebler)

Cassida desertorum Gebler, 1833, Bull. Soc. Nat. Moscou, 6:305[1]. (Type in Moscow Museum.)

Cassida gibbula Boheman, 1854, Mon. Cassid., 2:430 (Turcomania).

Cassida salsolae (Becker ms.) Gemminger & Harold, 1874, Cat. Col., 12:3653[2]; Desbrothers, 1891, Mon. Cassid.: 42.

Cassida Jakowlewi Reitter, 1889, Deutsche Ent. Zeits., 1889:288.

Cassida desertorum ab. *araxicola* Reitter, 1889, l. c.[3].

Ischyronota desertorum, Jacobson, 1901, Wien. Ent. Ztg., 20:125; Spaeth, 1914, Col. Cat., 62:87[4].

Ischyronota desertorum ab. *basimargo* Reitter, 1901, Wien. Ent. Ztg., 20:108[5].

Pale greenish; pronotum pale, tinged with rosaceous anteriorly and on margins; scutellum reddish; elytra variegated with reddish. Ovate; antennae thickened distally, last segment acuminate; prothorax semicircular, deflexed laterally and anteriorly, bisinuate basally; pronotum strongly convex in center, finely punctulate; scutellum large, triangular; elytra broader than prothorax, longer than broad, narrowed posteriorly, reflexed beyond middle; humeri prominent, tuberculate; discs vaguely punctulate, subseriately near suture; ventral surfaces punctured. Length 3.5 mm.; breadth 2 mm.

China: Central Asia[4].

Distribution: Southern Russia[1,2,3,5] to central Asia[4].

Genus **Chiridopsis** Spaeth

Deloyala Chevrolat, 1837, in Dejean, Cat. Col., ed. 3:371, 395 (part).

Chirida Weise, 1896, Deutsche Ent. Zeits., 1896:12 (part); Spaeth, 1914, Col. Cat. 62:124 (part); Maulik, 1919, Fauna Brit. Ind., Hisp. Cass.: 412.

Chiridopsis Spaeth, 1924, Voy. Alluaud et Jeannel Afrique Or., 18:337.

Body subcircular in dorsal outline, strongly convex, subrounded above. Prothorax grooved at sides for reception of antennae. Tarsal claws strongly toothed basally.

Head covered by pronotum, rounded-oval in anterior outline; strongly oblique in lateral outline; mouthparts largely exposed; fronto-clypeal area trapeziform, emarginate on inferior margin, broader than long, subevenly convex. Antennae attaining or slightly exceeding humeral angles of elytra, slender and cylindrical in distal third; last segment acuminate; scape longer than third segment; fourth as long as, or longer than, third or fifth. Prothorax grooved on each pleuron for reception of antennae; ridge on outer side of groove not reaching as far posteriorly as lateral angle of acetabulum; pronotum narrower than elytra, transversely oval, produced opposite scutellum; disc convex and even; explanate margins subhorizontal, raised above head, smooth, almost as large, in area, as disc. Scutellum equilaterally triangular. Elytra subevenly convex, feebly swollen behind scutellum, subregularly punctured on discs; explanate margins about one-half as wide as discs, declivitous at an angle of about forty-five degrees at sides. Prosternum nearly twice as wide posteriorly as between acetabula, obtusely rounded posteriorly. Tarsi one-third as broad as long; claws strongly toothed basally.

Generotype: *Chirida aubei* Boheman (Africa).

Range: Oriental and Ethopian regions.

Key to the Chinese Species of Chiridopsis

1. Each elytron marked with three rounded discal spots of black; pronotal disc and scutellum reddish ..... *C. bowringii*

— Elytral discs black with a number of small irregular roundish spots of yellowish testaceous on each, partly fused; scutellum dull testaceous ..... *C. punctata*

Chiridopsis bowringii (Boheman)

(Plate 29, figure 2)

Coptocycla Bowringii Boheman, 1885, Mon. Cassid., 2:123[1]. (Type in Stockholm Museum.)

Chirida bowringii, Maulik, 1913, Rec. Ind. Mus., 9:116[2]; 1919, Fauna Brit. Ind., Hisp. & Cass.: 416[3]; Gressitt, 1938, Lingnan Sc. Jl., 17:193[4], 589[5].

Chirida Bowringii, Spaeth, 1914, Col. Cat., 62:125[6].

Chiridopsis Bowringii, Spaeth, 1930, Cat. Col. Reg. Palaearct., 2:1359.

Dorsal surfaces yellowish testaceous, marked with black and red: pronotal disc almost entirely red, narrowly bordered with black basally; scutellum red; elytra black along suture; disc of each with three large rounded black spots, first on humeral callus, second near suture at middle, third placed posterolaterally; ventral surfaces entirely testaceous; terminal antennal segments slightly pitchy.

Body rounded-oval in dorsal outline, broadest near middle, about one-half as deep as broad. Pronotum two-thirds again as broad as long, convex, impunctate. Elytra regularly punctured in ten rows of widely spaced small punctures on each. Antennae reaching slightly beyond elytral humeri, which are directed downward. Length 5.4–6.8 mm.; breadth 4.8–5.5 mm.

China: Hong Kong[1]; Kwangtung (White Cloud Mountain[5]); Hainan Island[4,5] (Ta-hian, Cheung-kon, Tai-ping, Tai-tsing-lam-ts'uen, Sam-kwong-ts'uen, Nam-fung, Ch'ung-mei, Nam-cha-chuen). April to November.

Distribution: South China; Hong Kong; Hainan; Tonkin[6]; Burma[2,3].

Chiridopsis punctata (Weber)

(Plate 29, figure 1)

Cassida punctata Weber, 1801, Obs. Ent., 1:51[1].

Cassida punctaria Fabricius, 1801, Syst. Eleuth., 1:392[2]; Olivier, 1808, Ent., 6:965; 97, pl. 6, fig. 90.

Coptocycla punctaria, Boheman, 1855, Mon. Cassid., 3:254; Baly, 1863, Jl. Ent., 2:14[3].

Chirida punctaria, Weise, 1897, Deutsche Ent. Zeits., 1897:108.

Chirida punctata, Spaeth, 1914, Col. Cat., 62:125[4]; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 415[5]; Gressitt, 1938, Lingnan Sc. Jl., 17:193[6], 589[7].

Dorsal surfaces shiny yellow, marked with black: pronotal disc with two arcuate marks near base which fuse to form an inverted "W"; disc of each

elytron black with numerous partly coalescent medium-sized yellow spots, and external portions largely yellow; ventral surfaces and appendages entirely testaceous.

Dorsal outline rounded-oval, broadest at middle, not quite one-half as deep as broad. Pronotum two-thirds again as broad as long, moderately convex, microscopically punctulate. Elytra with discs finely punctured in ten longitudinal rows, punctures irregularly spaced, practically lacking on yellow spots. Antennae reaching to just beyond elytral humeri. Length 5.8–6.7 mm.; breadth 5–5.8 mm.

One (Lingnan) Nam-kio, February 1947.

China: Kwangtung (Yao Shan[7]); Hainan Island[6,7] (Nodoa, Nam-fung, Cheung-kon, Tai-pin, Nam-liu-tin, Sam-kwong-ts'uen, Tun-heung-ts'uen, Lok-kei, Kan-sho, Poh-shang, Nam-kio). March to November.

Distribution: Burma[5]; South China; Hainan; Indo-China[3,4]; Thailand[3]; Sunda Islands[1,2].

The Chinese material may possibly represent the subspecies *D. punctata indochinensis* Spaeth (1919, Ann. Mus. Nat. Hung., 17: 199) if the latter is a valid subspecies.

Genus **Cassida** Linnaeus

Cassida LINNAEUS, 1758, Syst. Nat., ed. 10, 1:362; FABRICIUS, 1801, Syst. Eleuth., 1:387; SUFFRIAN, 1844, Stett. Ent. Ztg., 5:49; BOHEMAN, 1854, Mon. Cassid., 2:329; CHAPUIS, 1875, Gen. Col., 11:338; WEISE, 1893, Ins. Deutschl., 6:1070; REITTER, 1912, Fauna Germ., 4:213; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.:361; SPAETH, 1926, Best.-Tab. Eur. Col., 95:23.

Cassidula, *Coptocycla*, *Deloyala*, *Metriona*, *Mionycha*, *Odontionycha*, *Taiwania*, *Tylocentra*, see subgenera, below.

Body rounded to elliptical or trapeziform in dorsal outline, fairly flat to strongly convex. Head with mouthparts largely visible. Antennae short to fairly long. Pronotum broader than long, completely covering head. Elytra punctured, often uneven, with distinct explanate margins, which are rarely very steeply declivitous; epipleurae lacking long fine hairs at extreme apices. Posternum lacking distinct grooves for reception of antennae. Tarsal claws toothed or not toothed basally, never with lateral combs.

Generotype: *Cassida nebulosa* Linnaeus (Palearctic region).

Range: Old World.

KEY TO THE CHINESE SUBGENERA OF CASSIDA

1. Elytral discs generally strongly convex; explanate margins of elytra more than one-half as wide at middle as elytral discs, transparent and unpigmented in central portion; suture often raised into a tubercle behind scutellum; tarsal claws toothed (except in *Lasiocassis*) 2

— Elytral discs rarely strongly convex; explanate margins of elytra generally less than one-half as wide at middle as elytral discs, opaque or feebly transparent, generally pigmented similarly to disc; suture rarely raised into a distinct tubercle behind scutellum; tarsal claws not toothed (toothed in *Odontionycha*) 3

2.(1) Tarsal claws not toothed; body pentagonal in dorsal outline, very strongly tuberculate at summit of elytra; elytral discs coarsely rugose; explanate margins of elytra heavily and broadly pigmented at humeral and posterolateral angles ..... *Lasiocassis*

— Tarsal claws more or less distinctly toothed; body oval or subrounded in dorsal outline, always rounded posteriorly, generally feebly tuberculate at summit of elytra; elytral discs at most feebly rugose; explanate margins rarely very broadly pigmented at either humeral or posterolateral angles..... *Taiwania*

3.(1) Tarsal claws not toothed basally 4

— Tarsal claws toothed basally; body broad and flat ..... *Odontionycha*

4.(3) Tarsal claws strongly divergent, not minute, projecting at least slightly beyond end of lobes of third tarsal segment, not hidden by hairs of latter 5

— Tarsal claws narrowly divergent, minute, hidden by hairs of third tarsal segment; frontoclypeal area with central portion narrowly triangular; elytra regularly seriate-punctate ..... *Mionycha*

5.(4) Explanate margins of elytra steeply declivitous, generally projecting farther interior than ventral surfaces of body, forming a concavity 6

— Explanate margins of elytra feebly declivitous; body generally broadly oval or oblong and flattened ..... *Cassida*

6.(5) Elytra evenly convex; third interpunctural area with scattered punctures; middle coxae close together; ventral surfaces largely black ..... *Cassidula*

— Elytra moderately tuberculate at summit; third interpunctural area lacking punctures; middle coxae widely separated; ventral surfaces green or yellow ..... *Tylocentra*

Subgenus **Lasiocassis** Gressitt, new subgenus

Deloyala REDTENBACHER *(not* Chevrolat), 1858, Fauna Austr., ed. 2:952; 1874, Fauna Austr., ed. 3, 2:520; WEISE, 1893, Ins. Deutschl., 6:1076; SPAETH, 1926, Best.-Tab. Eur. Col., 95:15, 61; CHUJO, 1934, Sylvia, 5:167; LIU, 1936, Lingnan Sc. Jl., 15:258.

Body subpentagonal in dorsal outline, obtuse anteriorly, narrowed posteriorly, subtransverse apically; sides fairly straight. Pronotum transverse, broadly rounded at middle of each side. Elytra strongly convex, strongly tuberculate at summit; discs coarsely subreticulate-rugose. Tarsal claws untoothed, widely divergent and projecting beyond lobes of third tarsal segment.

Subgenerotype: *Cassida vespertina* Boheman (eastern Palearctic).

Range: Southern and eastern portions of Palearctic region.

In addition to the type, this subgenus includes *Cassida seraphina* Menetries and *C. hablitziae* Motschulsky *(C. testudo* Suffrian).

Cassida (Lasiocassis) vespertina (Boheman)

Cassida vespertina Boheman, 1862, Mon. Cassid., 4:357[1]; Baly, 1874, Trans. Ent. Soc. London, 1874:213[2]; Gorham, 1885, Proc. Zool. Soc. London, 1885:282. (Type in Stockholm Museum.)

Deloyala vespertina, Weise, 1900, Arch. f. Naturg., 66, 1:295[3]; Spaeth, 1914, Suppl. Ent., 3:19[4]; 1926, Best.-Tab. Eur. Col., 95:61[5]; Yokoyama, 1931 (Col. Japan), 2:19, pl. 3, fig. 4; Yuasa, 1932, Nippon Konchu Zukan: 586, fig. 1145; Liu, 1936, Lingnan Sc. Jl., 15:258; Gressitt, 1938, op. cit., 17:586[6].

Cassida (Deloyala) vespertina, Spaeth, 1914, Col. Cat., 62:95; Chujo, 1934, Sylvia, 5:168[7]; Gressitt, 1939, Pan-Pac. Ent., 15:142[8].

Dorsal surfaces black to pitchy brown except for central two-thirds of anterior portion of explanate margin of pronotum, middle third of explanate margin of each elytron and a small area on apical margin of each near suture; scutellum sometimes brown; ventral surfaces testaceous brown to pitchy black; head and basal half of antennae testaceous; apical half of antennae dusky; legs testaceous with femora dusky basally.

Dorsal outline subtrapeziform, broader anteriorly; rather strongly convex; tuberculate behind scutellum. Pronotum fully twice as broad as long, evenly rounded laterally, produced and truncate opposite scutellum, finely punctured on both disc and explanate margin, subvermiculate on sides of disc. Elytra rough, strongly tuberculate with a laterally bifurcating and rebranching transverse ridge on each, and some other swellings or ridges; punctures close and transverse, seriate except for interruptions; explanate margins rough. Length 4.7–6.7 mm.; breadth 4–5.8 mm.

Some (Lingnan) Ta-chu-lan, Shaowu, April-June, Maa; (M.C.Z.) Changyang, near Ichang, 4–6,000 feet, July 1887, A. E. Pratt; Ching-cheng Shan, July 1932, G. Liu; (Heude) Yang-kia-ping, July 1937; (C.A.S.) Mt. Takao, near Tokyo, May 4, 1930, Chirifu, near Rokki, May 18, 1934, Hassensan, June 25, 1934, and Musha, August 24, 1947, Taiwan, Gressitt; (U.S.N.M.) Muping (Moupin) 7,000–13,000 feet, July 6, 1929, D. C. Graham.

Hosts: According to the writer's recollection, this species probably feeds on thistles or other Compositae.

China: Mongolia[5]; North China[1]; Chahar (Yang-kia-ping); Szechuan[5] (Kuanhsien, Ching-cheng Shan); Sikang (Moupin); Hupeh (Chang-yang) Formosa[4,7] (numerous localities); Hunan (Lam-mo[6]); Kwangtung[6] (Yao Shan; Lien-ping); Fukien (Shaowu); Chekiang[8] (Mokan Shan, Hangchow). April to August.

Distribution: Amur[3]; Ussuri[5]; China; Formosa; Korea[5]; Japan[2]; Ryukyu Islands[7] (Miyako, Ishigaki).

Subgenus **Taiwania** Spaeth

Coptocycla of authors. (Old World species, part.)

Metriona of authors. (Old World species, part or all.)

Taiwania Spaeth, 1913, Ann. Mus. Nat. Hung., 11:48.

Body rounded-ovate in dorsal outline, generally very little longer than broad. Antennae generally reaching well beyond humeral angles of elytra. Pronotum transverse, broadly rounded laterally, rarely punctured. Elytra more or less swollen at suture behind scutellum; discs rather strongly convex, more or less seriate-punctuate, sometimes partly rugulose; explanate margins more than one-half as wide as discs at middle, almost always at least subtransparent in central portions. Tarsal claws widely separated, more or less distinctly toothed basally.

Subgenerotype: *Taiwania sauteri* Spaeth (Indo-Chinese subregion).

Range: Oriental region and probably also Ethiopian and Australian regions.

The name *Taiwania,* founded as a genus by Spaeth for a Taiwan species *(T. sauteri* Spaeth), has heretofore been used for only three species (from Taiwan, South China, and Indo-China), two of which have been united. The writer believes that this name is available for use in a subgeneric sense for all or most of the species from Asia and Africa placed in *Metriona* and some of those still assigned to *Coptocycla* or *Cassida.*

KEY TO THE CHINESE SPECIES OF TAIWANIA

1. Explanate margins of elytra each with a dark humeral area or dark basal margin 2
— Explanate margins of elytra lacking humeral dark spots 7
2.(1) Explanate margins of elytra lacking a posterolateral dark spot 3
— Explanate margins of elytra each with a posterolateral dark spot 4
3.(2) Explanate margin of each elytron with a narrow oblique basal spot separated from basal margin by a pale border nearly as wide as dark spot; elytra twice as wide as pronotum, lacking coarse transverse rugae ..... *T. eoa*
— Explanate margin of each elytron with a broad basal area touching basal margin; elytra much less than twice as wide as pronotum, with coarse transverse or oblique rugae on discs ..... *T. sigillata*
4.(2) Puncture-rows of elytral discs narrower than interpunctural areas; body generally more than six mm. in length 5
— Puncture-rows of elytral discs fully as wide as interpunctural areas; body less than six mm. in length; elytra with a moderate, obtuse tubercle at summit ..... *T. quadriramosa*
5.(4) Elytral discs without a distinct postscutellar tubercle 6
— Elytral discs with a prominent postscutellar tubercle, without distinct black spots, not entirely smooth; punctures subfoveate, blunt ..... *T. rati*
6.(5) Explanate margin of each elytron narrowly black on basal margin; elytral disc with a distinct black spot on humeral callus and a spot at summit of suture; disc smooth with fine punctures ..... *T. purpuricollis*
— Explanate margin of each elytron broadly black on basal margin; elytral disc without a distinct black spot on humeral callus or on summit, but with

irregular spots, particularly at sides; pronotum almost entirely pale..... *T. amurensis*

7.(6) Pronotum narrowed and angulate at each side, not broadly rounded; humeri meeting sides of pronotum rather closely, both as regards external margin and inclination 8

— Pronotum broadly rounded at each side; humeri not meeting sides of pronotum very closely, projecting and inclined somewhat at a steeper angle 14

8.(7) Pronotum slightly punctured; body less than 5 mm. in length; explanate margins of elytra punctured..... 9

— Pronotum impunctate; body generally more than 5 mm. in length; explanate margins of elytra impunctate..... 11

9.(8) Head sparsely or indistinctly punctured; lateral angles of pronotum nearly right angles 10

— Head finely and closely punctured; lateral angles of pronotum obtuse; dorsum yellowish with elytral punctures brown; elytral punctures widely and irregularly spaced..... *T. juno*

10.(9) Explanate margins of elytra more than one-half as wide as discs at middle, fully one-half as wide at apices as at widest portions; elytral discs marked with black ..... *T. imitatrix*

— Explanate margins of elytra hardly one-half as wide as discs at middle, much less than one-half as wide at apices as at widest portions; elytral discs entirely pale ..... *T. obtusata*

11.(8) Elytra with a raised X-shaped area astride suture at summit, which is often paler than rest of surface..... 12

— Elytra lacking a raised X-shaped area astride suture at summit..... 13

12.(11) Explanate margins of elytra nearly three-fourths as wide as respective discs; pronotal disc evenly convex..... *T. expansa*

— Explanate margins of elytra barely over one-half as wide as respective discs; central portion of pronotal disc more strongly convex than remainder; posterolateral portion of elytral explanate margin often with a dark band..... *T. versicolor*

13.(11) Sides of elytral discs and explanate margins steeply and subevenly declivitous; dorsum entirely pale or with a prominent U-shaped black mark on elytra ..... *T. circumdata*

— Sides of elytral discs and explanate margins not equally declivitous, forming a strong angle with each other; dorsum greenish yellow with black spots..... *T. plausibilis*

14.(7) Body oblong-scutiform in dorsal outline, broadest at humeral angles, narrowed posteriorly, more than six mm. in total length..... 15

— Body rounded oval or rounded oblong, broadest behind humeri, less than six mm. in total length..... 16

15.(14) Fifth and sixth puncture-rows not very deeply impressed behind middle; pronotum more than twice as broad as long, distinctly more convex anteriorly ..... *T. sauteri*

— Fifth and sixth puncture-rows deeply impressed behind middle; pronotum not quite twice as broad as long, transversely symmetrical..... *T. spaethiana*

16.(14) Dorsal surfaces entirely testaceous or greenish; ventral surfaces black with abdomen bordered with pale 17

— Dorsal surfaces spotted or extensively marked with black; head and abdomen, or head and thoracic sterna, reddish or yellow, or ventral surfaces entirely pale 18

17.(16) Pronotum one-half as long as broad; dried specimens partly greenish; puncture-rows as broad as interpunctural areas; second interpunctural area slightly raised ..... *T. expressa*

— Pronotum three-fifths as long as broad; dried specimens not partly greenish; puncture-rows narrower than interpunctural areas; a raised crescent on each side of summit of elytra; explanate margins undulating ..... *T. juglans*

18.(16) Pronotal and elytral discs almost entirely black; pronotum twice as broad as long; lateral outline slightly convex between summit of elytra and anterior border of pronotum; puncture-rows completely regular at central portions of sides of elytra ..... *T. discalis*

— Pronotal disc entirely pale; elytral discs black with two irregular, broad oblique bands, and outer border, on each, yellowish; lateral outline straight or partly concave between summit of elytra and another border of pronotum; puncture-rows somewhat confused or interrupted at central portions of sides of elytra ..... *T. insulana*

Cassida (Taiwania) amurensis (Kraatz), new combination

(Plate 29, figure 9)

Coptocycla amurensis KRAATZ, 1879, Deutsche Ent. Zeits., 23:141[1].

Metriona amurensis, SPAETH, 1914, Cat. Coleopt., 62:142; SPAETH & REITTER, 1926, Best.-Tab. Eur. Col., 95:65.

Dried specimens pale ochraceous, moderately transparent on sides of elytral explanate margins; pronotal disc with a faint pitchy mark on center; each elytral disc with humeral and posterolateral angles prominently black, and with a number of irregular blackish spots on disc; head and sides of abdomen pale; rest of ventral surfaces black; legs largely pale.

Head with frontoclypeus raised distally, grooved laterally. Antennae long; third segment much longer than second. Prothorax more than twice as broad as long, broadly rounded at sides, nearly flat. Elytra distinctly broader than prothorax, broadest slightly behind humeral angles; disc of each with fairly regular rows of moderate punctures which are distinctly narrower than interpunctural strips. Length 6.8–8 mm.; breadth 5.6–6.5 mm.

One (Heude) Hsiao-ling, August 16, 1938.

China: Manchuria (Hsiao-ling).

Distribution: Southeastern Siberia (Ussuri[1]); northeastern China.

Cassida (Taiwania) circumdata Herbst

(Plate 28, figure 2; plate 36, figures 6 and 9)

Cassida circumdata HERBST, 1790, Natursyst. Käf., 8:268, pl. 132, fig. 11[1]; OLIVIER, 1808, Ent., 6:967; 97, pl. 6, fig. 93; BOISDUVAL, 1835, Faune Ent. de l'Oceanie

(Astrolabe), 2:536; Maulik, 1919, Fauna Brit. Ind., Hisp. & Cass.: 404[2]. (Type in Berlin Museum ?.)

Cassida trivittata Fabricius, 1801, Syst. Eleuth., 1:397[3]; Olivier, 1808, Ent., 6:973; 97, pl. 6, fig. 103; Blanchard, 1853, Voy. Pole Sud (d'Urville) Zool., 4:323, pl. 18, fig. 16.

Cassida U-fuscum Wiedemann, 1823, Zool. Mag., 2:74.

Coptocycla circumdata, Boheman, 1855, Mon. Cassid., 3:279; Baly, 1863, Jl. Ent., 2:14[4]; Schönfeldt, 1890, Ent. Nachr., 16 (11):175.

Coptocycla trivittata, Boheman, 1855, Mon. Cassid., 3:280[5].

Coptocycla luzonica (Eschscholtz ms.) Gemminger & Harold, 1874, Cat. Col., 12:3667[6].

Metriona circumdata, Weise, 1901, Deutsche Ent. Zeits., 1901:53; Spaeth, 1903, Ann. Mus. Nat. Hung., 1:128; 1913, op. cit., 11:47[7]; Maulik, 1913, Rec. Ind. Mus., 9:114; Miwa, 1933, Trans. N. H. Soc. Formosa, 23: 12[8]; Liu, 1936, Lingnan Sc. Jl., 15:261[9]; Chujo, 1934, Sylvia, 5:161[10]; Gressitt, 1938, Lingnan Sc. Jl., 17:191[11], 386[12], 584[13]; 1939, Pan-Pac. Ent., 15:141[14].

Metriona circumdata ab. *pescadorensis* Chujo, 1934, Sylvia, 5:162[15].

Cassida cuticula Gressitt, 1938, Lingnan Sc. Jl., 17:191[16].

Biology: Schultze, 1908, Philip. Jl. Sc., B, 3:267: pl. 5, figs. 4–8, pl. 6, fig. 4[17]; Yeung, 1935, Lingnan Sc. Jl., 14:143[18].

Dorsal surfaces golden green in life, with or without black markings. Dried specimens either entirely testaceous or marked with black along median line from basal portion of pronotal disc to midpoint of elytral suture, and with a large, irregular, common U-shaped mark on outer portions of discs, the arms ending on humeral calli; antennae, legs, and ventral surfaces pale testaceous.

Dorsal outline rounded-oval; body strongly convex. Pronotum two-thirds as long as broad, rounded-angulate at middle of each side; disc smooth. Elytra each with ten regular puncture-rows; interspaces partly swollen near suture; explanate margins rather steeply declivitous. Length 4.2–5.6 mm.; breadth 3.2–4.7 mm.

Many (Lingnan) Shaowu, Wingan, Shanghang, Kienin, Len-cheng, March-September, Fukien, Maa; An-yuen, May, Kiang-ching, July, Gressitt & Djou; (A.M.N.H.) Yen-ping, Spring, 1915, June 17–20, 1927; (M.C.Z.) Foochow, April, 1886, Leech; (C.A.S.) Chizuka, Okinawa, 1945, G. Bohart.

Hosts: *Ipomoea palmata* Forst[17], *I. Batatas* Lamk., *I. aquatica* Forsk, *I. cairica* Sweet, *I. digitata* Linn[18].

China: Szechuan (Kiang-ching); Kiangsi (An-yuen); Fukien[12,13] (Amoy[9], Yen-ping, Foochow, Shaowu, etc.); Kwangtung[12,13] (Yim-na Shan, Swatow[14], Canton, Shek-lung, Yao Shan, Meu-ming, Lien, Lo-ting and Ts'ing-yuen Districts, Tung-kwan); Hong Kong[13]; Kwangsi (Nanning); Hainan Island[11,13,16] (Hoihow, Cheung-kon, Tai-pin, Nam-liu-tin, Kachek, Nodoa, Dome Mountain, Nam-fung, Lung-tong, Ch'ung-mei, Ta-hau, Liamui, Ta-han, Kau-sha, Sam-kwong, Lin-fa-ling); Pescadores Islands[15]; Formosa[7,10]

(Kankau, Anping, Taihorin, Hozan, Taihoku and other localities at low or medium altitudes). Year-round at Canton.

Distribution: South Kyushu[10]; Ryukyu Islands (Yakushima; Amami-Oshima; Miyako Island; Ishigaki Island; Iriomote Island[8]); Taiwan; Philippine Islands[6]; South China; Indo-China[4]; India[2]; Ceylon; East Indies[1,3,5].

Maulik's record of *C. catenata* Boheman from China is placed here. Maulik (1919, p. 406) indicated that "*catenata*" is probably only a variety of "*circumdata.*"

Cassida (Taiwania) discalis Gressitt

(Plate 30, figure 4)

Cassida discale Gressitt, 1938, Lingnan Sc. Jl., 17:386[1], 587[2]. (Type in C.A.S.)

Dorsal surfaces with explanate margins pale testaceous and discs largely black or pitchy; pronotum pitchy reddish to blackish on basal two-thirds of disc, a small pale spot near center of basal margin; each elytral disc with two or three small pale dots forming an oblique band near top of posterior declivity and extreme apex of disc pale; ventral surfaces pale with thoracic sterna and intercoxal process of first abdominal segment pitchy black; antennae pale with distal segment dusky; legs pale.

Dorsal outline oblong-oval; body feebly convex, barely more than one-fourth as deep as broad. Pronotum transversely elliptical, nearly two and one-half times as broad as long, not quite as broad as elytra; disc even, feebly punctured; explanate margins smooth, broadly rounded laterally. Elytra slightly narrowed at humeral angles, feebly raised at suture behind scutellum; disc of each with ten regular rows of punctures; second interspace (third anteriorly) raised and crossed by a sinuous subtransverse low ridge from swelling on suture to median line of disc; explanate margins fully one-half as broad at middle as discs, declivitous at an angle of about 33 degrees. Antennae gradually thickened toward apices, reaching to humeral angles of elytra. Length 5 mm.; breadth 4.2–4.55 mm.

China: Kiangsi (Hong Shan[1]); Kwangtung (Loh-fau-Shan[2]). At altitudes of about 1,000 meters. June; October.

Distribution: Southeast China.

Cassida (Taiwania) eoa (Spaeth)

Metriona eoa Spaeth, 1928, Sbornik Ent. Odd. Mus. Praha, 6:46[1]. (Type in Prague Museum.)

Cassida eoa. Spaeth, 1938, Ent. Tidskr., 59:255[2]

Shiny; brownish yellow; elytral tubercles with a common pitchy black spot and a pitchy brown area on first and second interpunctural rows behind middle on each elytron, or with tubercle reddish brown and each elytron

with an oblique brown stripe from humerus to suture behind middle; explanate margin of each elytron with a narrow oblique basal spot separated from basal margin by a pale border nearly as wide as spot.

Form strongly triangular in dorsal outline; body broadest immediately behind humeri; moderately convex. Pronotum elliptical, more convex posteriorly; lateral angles rounded, placed before middle; disc feebly swollen, smooth. Elytra nearly twice as broad as prothorax; pronotal angles reaching end of first third of anterior border of explanate margin; humeri prominent, subacute; basal triangle of disc feebly impressed, followed by a low tubercle; lateral profile emarginate before and behind tubercle, less so behind; puncture-rows regular, deep and coarse, no finer posteriorly; interspaces narrow; a transverse ridge from tubercle to fourth interspace. Tarsal claws large. Length 6.5 mm.; breadth 5.5 mm.

China: Yunnan[1].

Distribution: Southwestern China; Burma[2].

Cassida (Taiwania) expansa Gressitt, new species

Dorsal surfaces greenish yellow to pitchy brown; pronotum pale yellowish, fairly transparent, marked on basal portion of disc with two anteriorly subdivergent pitchy-brown lines, each with a branch at apex diverging at a right angle, and basal margin of disc narrowly black; elytra each with explanate margin transparent hyaline and disc reddish brown with outer two interpunctural areas, four or five irregular spots along middle or near suture, as well as a large, transverse, common, X-shaped raised mark across summit, pale yellow with a greenish tinge, undoubtedly brilliant golden green in life; ventral surfaces, antennae and legs entirely pale testaceous.

Body almost perfectly circular in dorsal outline, narrowly emarginate between pronotum and humeri, moderately convex, barely one-third as deep as broad. Head with frontoclypeal area trapeziform, smooth, slightly convex, medially grooved. Antennae slender, hardly thickened distally, reaching well beyond humeral angles; third segment barely as long as fourth. Pronotum not quite twice as broad as long, narrowed and rounded-acute slightly anterior to middle of each side; disc distinctly convex, very feebly punctulate. Elytra with humeri slightly broader than pronotum, much narrower than widest portion, which is at middle of body; explanate margins impunctate, practically three-fourths as wide as discs at widest point; discs with a transverse, raised X-shaped mark across summit and a transverse, raised area at middle of lateral portion of each, partly seriate-punctate, punctures nearly as wide as interpunctural areas at middle, smaller elsewhere, lacking on all raised or pale areas except lateral borders, very few

punctures on apical quarter. Ventral surfaces finely punctured. Tarsal claws broadly toothed basally. Length 6.7 mm.; breadth 6.6 mm.

Holotype (Lingnan Natural History Museum), **Sam-kwong-ts'uen, Lam-wan-tung, Kiung-shan District, central Hainan Island,** altitude 300 meters, August 5–6, 1935, F. K. To.

Differs from *C. versicolor* Boheman in being broader, more perfectly circular in dorsal outline and relatively less strongly convex, with the pronotal disc more evenly convex and the explanate margins of the elytra much more than one-half as wide as the discs.

Distribution: Hainan Island.

Cassida (Taiwania) expressa (Spaeth), new combination

Metriona expressa SPAETH, 1914, Ent. Mitt., 3:230[1]. (Type in Spaeth collection, Manchester.)

Dorsal surfaces brilliant yellow; green in life; green color retained in dried specimens to greater or lesser degree: covering entire disc or only along a stripe parallel to suture and an area on center of disc; ventral surfaces black; abdomen narrowly bordered with yellow; head and legs yellow; antennae yellow with apices slightly darkened.

Subquadrate, feebly narrowed posteriorly; strongly convex; shiny. Prothorax smooth, transversely elliptical, twice as broad as long, with lateral angles broadly rounded and located at middle of sides. Elytra about one-fourth broader than prothorax and more than twice as long; humeri rounded, moderately prominent; sides broadest anterior to middle, weakly narrowed posteriorly; discs distinctly concave in basal triangle; profile slightly concave anterior to raised portion of suture, declivitous posteriorly; puncture-rows coarse and regular, as broad as interspaces, second interspace slightly broader and higher than others, with a transverse ridge connecting with tubercle on suture; explanate margins strongly declivitous, finely rugulose-punctate. Tarsal claws with large teeth. Length 5.2–5.8 mm.; breadth 4.2–4.8 mm.

Some (Lingnan & C.A.S.) questionably this species, Suisapa, Lichuan, August 19, 1948, Gressitt, *et al.*

China: Yunnan[1]; Hupeh (Lichuan).

Distribution: Southwestern China.

Cassida (Taiwania) imitatrix Gressitt, new species

(Plate 30, figure 5)

Dorsal surfaces pale hyaline to ochraceous, marked in part with black: pronotum with explanate margin subtransparent, hyaline yellow, and disc pale ochraceous, feebly marked with a short pitchy sublongitudinal line on

each side of center and a minute pitchy spot near middle of each side of disc; elytra with explanate margins similar to that of pronotum and discs translucent yellowish testaceous, marked with a narrow common spot at summit, an irregular, somewhat zig-zag mark extending from extreme base to apical third, crossing humeral callus and for most part external to median line of disc, as well as a few small scattered spots near scutellum, at middle and before apex, of black; ventral surfaces, legs and antennae testaceous, latter slightly darkened in distal quarter.

Body broadly rounded ovate in dorsal outline, broadest at end of basal third of elytra, somewhat narrowed posteriorly, evenly convex in transverse outline, not quite one-third as deep as broad, fairly even in lateral outline, a little more strongly declivitous posteriorly. Head with frontoclypeal area narrowly trapeziform, about twice as long as width at middle, not distinctly punctured. Antennae extending slightly beyond humeral angles, moderately and gradually thickened to end of basal third of last segment; third segment slightly longer than fourth or fifth. Pronotum fully twice as broad as long, transversely elliptical, rounded-subacute at lateral angles which are at middle of sides, symmetrical transversely except for a brief truncate projection at middle of basal margin; disc moderately convex, somewhat lobed above head, distinctly punctured on central portion. Scutellum subequilaterally triangular. Elytra with humeri rounded-subacute, projecting slightly beyond lateral angles of pronotum; explanate margins shallowly punctured, moderately declivitous, irregular along inner margins, fully one-half as wide as discs; suture moderately raised behind scutellum; disc of each with a transverse ridge from summit of suture to second interpunctural area where it branches obliquely anteriorly and posteriorly, with nine subregular rows of deeply impressed punctures, for most part as wide or wider than interpunctural areas and interrupted by forked swelling of summit. Ventral surfaces partially punctulate. Tarsal claws strongly toothed basally. Length 4.75 mm.; breadth 4.2 mm.

Holotype (Lingnan Natural History Museum), from mountains **five miles south of Lung-chow, Lung-chou District, Kwangsi Province, South China,** August 8, 1934, E. R. Tinkham.

Differs from *C. circumdata* Herbst in having the elytral explanate margins punctured and much less steeply declivitous, the elytral discs less evenly convex and the pronotal disc distinctly punctured. Differs from *C. obtusata* Boheman in having the elytral explanate margins fully one-half as wide as discs and the dorsum marked with black.

Distribution: South China.

Cassida (Taiwania) insulana Gressitt, new species
(Plate 30, figure 6)

Dorsal surfaces ochraceous marked with black: Pronotum entirely pale, ochraceous on disc and pale ochraceous hyaline on explanate margin; elytra with explanate margins similar to that of pronotum and discs black, each with a small spot at apex of scutellum, a large irregular area from base near scutellum to suture behind dorsal tubercle, an irregular spot at top of posterior declivity, and outermost interpunctural area, with an inward projection at middle of side and another at middle of apex, ochraceous; ventral surfaces testaceous, transparent; legs and antennae testaceous, latter very slightly darkened distally.

Body broadly rounded oval in dorsal outline, broadest very slightly anterior to middle, strongly convex, more than one-third as deep as broad; lateral outline rounded posteriorly, nearly straight from summit to anterior border of pronotum. Head with frontoclypeal area trapeziform, longer than broad, feebly punctured and slightly convex. Antennae just reaching to humeral angles or very slightly beyond, moderately and gradually thickened distally; third segment about as long as fourth. Pronotum slightly more than twice as broad as long, broadly rounded at middle of each side, evenly convex anteriorly and subtruncate posteriorly; disc subevenly convex, feebly punctured. Elytra with humeri rounded-subacute, slightly broader than pronotum; explanate margins slightly uneven; suggesting obsolete punctures, about one-half as wide as discs at middle; suture strongly raised behind scutellum; discs each with a transverse ridge from summit to second interpunctural area, continuing a short distance anteriorly and posteriorly as a feeble ridge, and ten rows of deep punctures, narrower than interpunctural areas near suture and outer margin, fully as wide in center. Ventral surfaces in part finely punctured. Tarsal claws distinctly toothed basally. Length 5.6 mm; breadth 4.75 mm.

Holotype (California Academy of Sciences), **Chirifu,** altitude 1,200 meters, **southeast of Rokki** (Rokkiri, Lakuli), **Kizan County, Kaoshiang** (Takao) **District, southwestern Taiwan,** May 19, 1934, Gressitt.

Differs from *C. versicolor* (Boheman) in having the pronotum punctured and more evenly convex, the elytral explanate margins shallowly punctured and the summit of the elytra not forming a raised X-shaped area. Differs from *C. imitatrix* Gressitt in having the pronotum broadly rounded at each side and the humeri declivitous and extending below sides of pronotum and each elytron with deep punctures along division between disc and explanate margin.

Another specimen, from Kosempo, Formosa, J. C. Thompson, in C.A.S. is not designated a paratype because the pronotum is more nearly plane,

with lateral angles behind middle, the dorsal tubercle is more abrupt, and the tenth puncture-row is incomplete.

Distribution: Taiwan.

Cassida (Taiwania) juglans Gressitt

Cassida juglans GRESSITT, 1942, Lingnan Nat. Hist. Surv. & Mus. Spec. Publ., 5:4, fig. 4[1]. (Type in Musée Heude.)

Dorsum pale testaceous, somewhat ochraceous on scutellum, basal margins of prothorax and elytra, elytral suture and sides of elytral discs; antennae testaceous with last four segments slightly pitchy; ventral surfaces black with outer borders of abdomen testaceous; legs pale brownish testaceous with coxae, trochanters, and extreme bases of femora blackish.

Broadly oval, strongly convex and irregular. Head feebly punctured distally. Prothorax nearly three-fifths as long as broad, evenly rounded anteriorly, obtusely rounded laterally and somewhat sinuate posteriorly; disc evenly convex, distinctly though finely punctured; explanate margins not distinctly punctured; scutellum subequilateral, impunctate. Elytra slightly broader than prothorax at base, widened toward middle, strongly convex; suture distinctly raised; disc subregularly and rather finely punctured, highest portion with a short low transverse ridge connecting suture with an externally open low arcuate ridge; explanate margins strongly declivitous anteriorly, less so posteriorly, distinctly punctured, anteriorly with a few swellings extending from disc; ventral surfaces minutely punctured. Length 4.8–5 mm.; breadth 3.95 mm.

China: Chekiang (Mokan Shan[1]).

Distribution: Eastern China.

Cassida (Taiwania) juno Boheman

Cassida juno BOHEMAN, 1862, Mon. Cassid., 5:324[1]. (Type in Stockholm Museum ?.)

Dorsal surfaces entirely yellowish, shiny, with elytral punctures brownish; ventral surfaces testaceous with metasternum black and four basal abdominal segments each with a transverse pitchy black band; four distal antennal segments slightly darkened.

Body subrounded in dorsal outline, strongly convex. Head finely and closely punctured; pronotum broader than long, rounded anteriorly, basal margin sinuate on each side and with median lobe rounded-emarginate; lateral angles obtuse; disc convex, minutely punctulate; explanate margins broad, subtransparent. Elytra slightly broader than, and twice as long as,

pronotum; humeri subangulate, moderately prominent, narrower than elytra in middle; discs seriate-punctate, punctures widely and irregularly spaced, surfaces depressed near scutellum, feebly swollen on suture behind scutellum; explanate margins moderately broad, obliquely deflexed, subhyaline, obsoletely punctured. Length 4.5 mm.; breadth 4 mm.

China: Hong Kong[1].

Distribution: South China.

Cassida (Taiwania) obtusata Boheman

(Plate 34)

Cassida obtusata BOHEMAN, 1864, Mon. Cassid., 2:405[1]; SPAETH, 1914, Suppl. Ent., 3:192; MAULIK, 1919, Fauna Brit. Ind., Hisp. & Cass.: 376[3]; CHUJO, 1934, Sylvia, 5:173[4]; GRESSITT, 1938, Lingnan Sc. Jl., 17:192[5], 387[6], 588[7]; 1939, Pan-Pac. Ent., 15:142[8]. (Type in Stockholm Museum.)

BIOLOGY: KERSHAW & MUIR, 1907, Trans. Ent. Soc. London, 1907:251[9].

Brilliant golden in life; dried specimens with dorsal surfaces pale yellowish testaceous, with a slightly dirty brown appearance; explanate margins and much of elytral discs fairly transparent; pronotal disc and outermost interpunctural areas of each elytral disc partly opaque or translucent and yellowish brown; sometimes with a tinge of greenish near scutellum; ventral surfaces partly pitchy black on metasternum and abdominal sternites, testaceous on remainder and legs; antennae testaceous with last three segments partly pitchy.

Small, short, broadly rounded-ovate, narrowed posteriorly; moderately convex. Pronotum about twice as broad as long, subregularly elliptical; lateral angles obtuse and rounded; disc gradually declivitous and shallowly punctured. Elytra slightly raised at suture behind scutellum, otherwise fairly even and regularly punctured in ten rows. Length 3.7–5 mm.; breadth 2.8–4 mm.

Some (Lingnan) Chungan, Wingan, Maa; New Territories, Hong Kong, 1940–1941, Gressitt; (A.M.N.H.) Yen-ping, Spring, 1915, H. Caldwell.

Hosts: *Celosia argentea* Linn., *Amaranthus* spp. Adults also feed on *Citrus* spp[9].

China: Fukien (Chungan, Wingan, Yen-ping); Kwangtung[5,7] (Yim-na Shan, Canton, Hoppo, Ng-ch'uen, Kwang-chau-wan, On-po, Chung Shan, Meu-ming); Macao[9]; Hong Kong[8]; Hainan (Kainan) Island[6,7] (Dome Mt., Nodoa, Hoihow, Kachek, Five Finger Mts., Ngai-chau, Nam-fung, Loh-fung-tung, Cheung-kon); Taiwan[2,4] (Tainan, Shinkwa). Year-round at Canton.

Distribution: South China; Taiwan; Indo-China[2]; Burma[3]; India[1,3]; Luzon[2].

Cassida (Taiwania) plausibilis (Boheman), new combination
(Plate 28, figure 4)

Coptocycla plausibilis Boheman, 1862, Mon. Cassid., 4:395[1]; Baly, 1863, Jl. Ent., 1:14[2]. (Type in Stockholm Museum.)

Metriona plausibilis, Spaeth, 1914, Col. Cat., 62:144.

Metriona sp. Gressitt, 1938, Lingnan Sc. Jl., 17:191[3].

Metriona objecta, Gressitt *(not* Spaeth ?), 1938, t. c.: 584[4].

Testaceous yellow; part of basal margin of pronotum narrowly black; elytra marked with black spots on disc of each; three in a longitudinal row parallel to suture, five in a median row, the last, and largest, behind humeral callus; spots sometimes reduced to three or four, along suture and base.

Subrounded in outline; strongly convex. Prothorax one-half again as broad as long, broadly rounded anteriorly, smooth and shiny. Elytra nearly one-half again as broad as prothorax; humeri moderately prominent, subacute; discs depressed along suture and near scutellum, subrugose basally, deeply and closely seriate-punctate with interstices convex. Ventral surfaces punctured. Length 6 mm.; breadth 5.5 mm.

China: China[1]; Hainan Island[3,4] (Ta-hian, Ta-hau, Dome Mt., Hau-ying-ts'uen, Ch'ung-mei, Nam-fung, Lin-fa Shan, Fan-ta, Cheung-kon, Tai-tsing-tsing-lam).

Distribution: South China; Cambodia[2]; Hainan; Thailand[2].

From comparing these specimens from Hainan with the original descriptions of *"plausibilis"* and *"objecta,"* the writer is inclined to the opinion that the latter may be a subspecies or synonym of the former.

Cassida (Taiwania) purpuricollis (Spaeth), new combination

Metriona purpuricollis Spaeth, 1914, Ent. Mitt., 3:229[1]. (Type in Spaeth collection.)

Dorsal surfaces yellow; pronotal disc and scutellum purplish red; scutellum bordered with black; elytra bordered with black basally and on suture at apices, with five black spots: one on each humeral callus, a common one on suture behind scutellum and one on each explanate margin well behind middle; ventral surfaces black with border of abdomen very narrowly pale; legs yellow with bases of femora black; head reddish yellow; antennae yellow basally, brownish on fifth and sixth segments and remainder black.

Subtriangular, widest just behind humeri, slightly narrowed posteriorly; convex; shiny; glabrous. Prothorax small, transversely elliptical, twice as broad as long, with lateral angles broadly rounded, located at middle of sides; disc and margins smooth. Elytra twice as broad basally as prothorax; humeri subacute, strongly projecting at sides and reaching forward to a line through middle of prothorax; discs moderately convex, each with ten regular puncture-rows, the interspaces two to three times as broad as puncture-rows, feebly swollen and smooth; explanate margins very indistinctly

rugulose-punctate, nearly smooth, strongly narrowed posteriorly. Prosternum fairly narrow between anterior coxae, its process angulately broadened, transversely triangular. Tarsal claws with large right-angled teeth, reaching beyond third tarsal segment. Length 7 mm.; breadth 5.5 mm.

One topotype (U.S.N.M.), identified by Spaeth.

China: Yunnan (Kunming[1]).

Distribution: Southwestern China.

Cassida (Taiwania) quadriramosa Gressitt, new species

Dorsal surfaces largely transparent reticulated with yellowish testaceous, marked with reddish brown; pronotum transparent, reticulate hyaline on explanate margins, slightly reddish yellow below disc; scutellum transparent, hyaline yellowish; elytra hyaline with discs reticulated with pale yellowish, marked with reddish brown at sides except at middle of lateral borders; explanate margins pale yellowish with humeri reddish brown and a squarish spot of same on posterolateral portion of each; ventral surfaces of body, as well as legs and antennae, testaceous.

Body with dorsal outline rounded-pentagonal, slightly longer than broad, nearly three-eighths as deep as wide. Head fully as broad as long; eyes large, broader than frontoclypeal area, which latter is subtriangular, slightly raised and nearly impunctate. Antennae slender in basal half, thickened and hairy distally, reaching beyond humeral angles by about three segments; third segment one-half again as long as second, subequal to fourth and fifth, separately. Pronotum practically twice as broad as long, evenly convex anteriorly, sinuate basally; lateral angles somewhat broadly rounded, placed at about middle, in longitudinal sense; disc smooth, impunctate; explanate margin slightly raised above head. Scutellum scutiform. Elytra barely broader than long; suture with a low, rounded-obtuse tubercle behind scutellum; disc of each with ten rows of fairly deep and regular punctures, each about as wide as spaces between them; humeri rounded, narrower than elytra at middle, and about one-fifth broader than pronotum; explanate margins at middle more than one-half as wide as discs, fully twice as wide as margins at apices. Tarsal claws toothed basally. Length 4.6 mm.; breadth 4.3 mm.

Holotype (Museum of Comparative Zoology) **Chang-yang,** altitude 4–6,000 feet, **near Ichang, Hupeh Province, central China,** July 1887, A. E. Pratt.

Differs from *C. rati* Maulik in being smaller, less strongly convex, more rectangular and paler, with the pronotum not fully twice as broad as long, the elytra less strongly tuberculate at summit, with punctures much larger, as wide as interspaces, and discs not distinctly swollen at middle of each side, and the suture not distinctly pigmented at apex.

Distribution: Central China.

Cassida (Taiwania) rati Maulik

Cassida rati MAULIK, 1923, Proc. Zool. Soc. London, 1923:605, text-fig. 6[1]; SPAETH, 1938, Entom. Tidskr., 59:236[2]. (Type in British Museum.)

Metriona rati, SPAETH, 1928, Sbornik Ent. Odd. Nar. Mus. Praze, 6:46.

Moderately convex, broad and subtriangular in outline. Reddish ochraceous; explanate margins amber-yellow except for a dark pitchy red spot on each at humerus and another similar one somewhat behind middle; suture also darkened at apices and sides of disc darkened in an arcuate band which connects dark patches of explanate margins; antennae with last four segments pitchy black; ventral surfaces black with pleura and coxae largely ochraceous; legs ochraceous.

Frons with a swelling near antennal insertions; antennae reaching to slightly beyond humeral angles of elytra, fairly slender, hardly thickened apically, with third segment twice as long as second; prothorax much narrower than elytra at humeri, fairly evenly convex anteriorly and laterally, slightly produced at middle of base, even and impunctate on disc; scutellum triangular, impunctate; elytra broadest at humeri, which are prominent and subrounded, rather strongly raised on suture behind scutellum, regularly and moderately punctured on discs, impunctate and smooth on the moderately declivitous explanate margins except for a ridge extending to border from disc just behind humerus and some similar ones near apex. Length 6.7–7 mm.; breadth 5.6–6 mm.

Several (C.A.S. & Lingnan) Shaowu, Kien-yang, April-August, Maa; Hong Shan, altitude 1,000 meters, June 1936, Gressitt.

China: Chekiang (Hangchow[2]); Kiangsi (Hong Shan); Fukien (Shaowu, Kien-yang); Taiwan (Arisan[2]).

Distribution: Manipur[1]; Burma[2]; South China; Taiwan[2].

Cassida (Taiwania) sauteri Spaeth

Taiwania sauteri SPAETH, 1913, Ann. Mus. Nat. Hung., 11:481; 1914, Suppl. Ent., 3:172; CHUJO, 1934, Sylvia, 5:1683. (Type in Budapest Museum (?).)

Taiwania achardi SPAETH, 1928, Sbornik Ent. Odd. Nar. Mus. Praze, 4:934.

Cassida sauteri, SPAETH, 1938, Ent. Tidskr., 59:236.

Color testaceous amber; pronotal and elytral discs deep reddish ochraceous, darker on sides of elytral discs, nearly black along sides above inner borders of explanate margins; antennae, legs and ventral surfaces reddish ochraceous.

Moderately large, broadly ovate. Frons impunctate, slightly convex; antennae not quite reaching to humeral angles of elytra, slightly thickened beyond middle, black at extreme tip; prothorax distinctly narrower than

elytra at humeri, nearly twice as broad as long, evenly rounded anteriorly and laterally, sinuate basally with a truncate process meeting scutellum; pronotal disc even and impunctate; scutellum triangular, impunctate; elytra broadest at about middle, with humeri prominent but rounded, suture raised behind scutellum, discs moderately punctured in regular rows and depressed anteriorly and externally to raised area on suture; explanate margins fairly declivitous, impunctate. Length 7–7.4 mm.; breadth 5.6–6 mm.

One (A.M.N.H.) Yen-ping, July 18, 1917, Harry Caldwell; one (C.A.S.) Urai, Formosa, June 26, 1932, Gressitt.

China: Fukien (Yen-ping); Taiwan[1,2,3] (many localities, mostly 300–2,000 meters in altitude).

Distribution: Taiwan; South China; Tonkin[4].

Cassida (Taiwania) sigillata (Gorham), new combination

Coptocycla sigillata GORHAM, 1885, Proc. Zool. Soc. London, 1885:284[1]; SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.):(131); 1914, Col. Cat., 62:130. (Type in British Museum.)

Metriona sigillata, SPAETH, 1926, Best.-Tab. Eur. Col., 95:66; CHUJO, 1934, Sylvia, 5:158; GRESSITT, 1939, Pan-Pac. Ent., 15:141[2].

Dorsal surfaces dark pitchy red-brown on pronotal and elytral discs and basal portion of explanate margin of each elytron; remainder of explanate margins hyaline, fairly transparent; outermost interpunctural area of each elytral disc yellowish; ventral surfaces black except for most of thoracic pleura and abdominal borders, which are testaceous, as are head, antennae and legs; coxae partly pale.

Body rounded-triangular in outline, broadest just behind humeri and not very strongly narrowed posteriorly; moderately convex. Pronotum nearly twice as broad as long, transversely elliptical with rounded angles at middle of each side; disc even and impunctate, slightly depressed on extreme base at each side of middle. Elytra distinctly broader than prothorax; humeri prominent and rounded; disc of each rather irregular, with ten rows of fine punctures, but with the rows interrupted by four major subtransverse sinuate ridges and some lesser swellings; explanate margins raised and coarsely punctured at humeri, narrowed posteriorly. Length 5.9 mm.; breadth 5.1 mm.

Some (Lingnan) Shaowu, April-May, Maa; Loh-chang, August, Tsang & Lam; (C.A.S.) Taiheizan, June, 1934, Gressitt; Arisan, March, 1935, Miwa.

China: Chekiang (Mokan Shan[2]); Fukien (Shaowu); Kwangtung (Loh-chang); Formosa (Taiheizan, Arisan). March to September.

Distribution: Japan[1] (Honshu); eastern China; Taiwan.

In the Taiwan specimen the elytral punctures are twice as large as in typical specimens, and there are almost twice as many per row. The specimen is otherwise typical.

Cassida (Taiwania) spaethiana Gressitt

(Plate 28, figure 5)

Taiwania spaethi Gressitt *(not* Weise, 1900), 1942, Lingnan Nat. Hist. Surv. & Mus. Spec. Publ., 5:2, fig. 2[1]. (Type in Lingnan Museum.)

Cassida spaethiana Gressitt, 1945, Lingnan Sc. Jl., 21:147 (n. n.).

Dull ochraceous to testaceous brown with some indistinct pitchy markings; explanate margins of prothorax and elytra transparent, pale golden amber, finely reticulate; head ochraceous; antennae ochraceous, pale reddish brown on distal segments; pronotal disc pale ochraceous, subtransparent; scutellum pale ochraceous, pitchy red along borders, as are basal margins of pronotum and elytra; elytral discs largely reddish or yellowish ochraceous, each paler to testaceous amber on inner three-fifths of basal half and yellowish testaceous along outermost interpunctural stripe, and on next to outermost at extreme base, middle of side and apical margin of disc, nearly pitchy to subtestaceous on inner portions of posterior half; ventral surfaces of body largely dirty ochraceous, partly transparent; legs orange ochraceous.

Frons trapeziform, impunctate; antennae reaching slightly beyond humeral angles, slender, feebly thickened and subacute distally; prothorax not quite twice as broad as long, symmetrical except for posterior median process, broadly rounded at sides; scutellum triangular, rounded posteriorly; elytra distinctly broader than prothorax, humeri projecting, explanate margins broad and moderately declivitous; disc of each with ten rows of fairly small punctures, a transverse swelling at suture behind scutellum and a concave area anterior to and external to this, fifth and sixth puncture-rows more deeply concave behind middle. Length 6.85 mm.; breadth 5.65 mm.

China: Northern Kwangtung (Lien-ping District[1]).

Distribution: South China.

Cassida (Taiwania) versicolor (Boheman)

(Plate 28, figure 6)

Coptocycla versicolor Boheman, 1855, Mon. Cassid., 3:414[1]. (Type in Stockholm Museum.)

Coptocycla Thais Boheman, 1862, Mon. Cassid., 4:463[2]; Baly, 1874, Trans. Ent. Soc. London, 1874:214[3]; Kraatz, 1879, Deutsche Ent. Zeits., 23:271; Gorham, 1885, Proc. Zool. Soc. London, 1885:284; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 65 (Sitzb.):(130)[4].

Coptocycla crucifera Kraatz, 1879, Deutsche Ent. Zeits., 23:271[5]; Gorham, 1885, Proc. Zool. Soc. London, 1885:283.

Metriona Thais, SPAETH, 1914, Col. Cat., 62:144; 1926, Best.-Tab. Eur. Col., 95:65[6]; YUASA, 1932, Nippon Konchu Zukan: 582[7], fig. 1143; CHUJO, 1934, Sylvia, 5:160; GRESSITT, 1938, Lingnan Sc. Jl., 17:585[8]; 1939, Pan-Pac. Ent., 15:141[9].

Metriona versicolor, SPAETH, 1914, Col. Cat., 62:144.

Metriona thais crucifera, SPAETH, 1914, l. c.; CHUJO, 1934, Sylvia, 5:160[10]; GRESSITT, 1938, Lingnan Sc. Jl., 17:191[11], 586[12].

Thlaspida chinensis, GRESSITT *(not* Spaeth), 1938, t. c.: 17:385[13].

Cassida versicolor ab. *crucifera*, SPAETH, 1938, Ent. Tidskr., 59:235[14].

Dorsal surfaces variable in color; pronotal disc generally dark on central swollen area, pale on lateral lobes, often with a pair of pale stripes near base; elytral discs with swollen areas, anterior portions of lateral borders, and some spots behind middle, pale, darkest on sublateral portions; each explanate margin with or without a pitchy oblique mark at posterolateral angle; ventral surfaces, legs and antennae testaceous, latter with distal segments sometimes darkened.

Dorsal outline subcircular, broadest at middle. Pronotum not quite as broad as long, more strongly convex basally than apically; sides rounded-angulate, angles slightly anterior to middle in longitudinal sense; disc impunctate, with central and lateral swollen lobes. Elytra with humeri subangulate, feebly projecting; discs transversely raised across suture behind scutellum, raised area branching obliquely forward and backward at each side; another transverse raised area on each at middle of side; surfaces deeply seriate-punctate, rows interrupted by raised areas. Length 5.3–6.2 mm.; breadth 4.8–5.3 mm.

Some (Lingnan) Shaowu, Chungan, Chang-ting, Bohea Hills, April-May, Fukien, Maa; Suisapa, Lichuan, July-August, 1948; (C.A.S.) Iriomote Island, Ryukyu Islands, August 20; Hassenzan, Taiwan, June 26, 1934, Gressitt; (Taiwan Agriculture Research Institute) Shuri, Okinawa, April, 1941, Matsuda.

Hosts: *Pyrus serotina* Rehder, *Malus* sp., *Sorbus gracilis* K. Koch, *Prunus* sp[7].

China: "N. China"[2]; Hupeh (Lichuan); Chekiang[9] (Mokan Shan, Hangchow); Kiangsi[13] (Hong Shan, Tai-au-hong, Kuling); Hunan[8] (Lammo); Fukien[13] (Shanghang, Shaowu, etc.); Kwangtung[13] (Tai-yong, Yao Shan, Lung-ping-hui); Hainan[11,12] (Nodoa, Tai-pin, Kom-yan); Taiwan[6,10] (northern part).

Distribution: Amur[4]; Japan[3,5]; Ryukyu Islands; Taiwan; China[1]; Hainan; Tonkin[6]; Burma[14].

Subgenus **Mionycha** Weise

Mionycha WEISE, 1891, Wien. Ent. Ztg., 10:204; 1893, Ins. Deutschl., 6:1075; SPAETH, 1926, Best.-Tab. Eur. Col., 95:24; CHUJO, 1934, Sylvia, 5:167.

Dorsal outline of body ovate or rounded; body fairly convex. Head black; central portion of clypeofrontal area forming a narrow triangle terminating in a longitudinal groove. Elytra with regular longitudinal rows of punctures. Tarsal claws not toothed, closely approximate, short, hidden in hairs of third tarsal segment.

Subgenerotype: *Cassida azurea* Fabricius (Europe).

Range: Palearctic region.

Cassida (Mionycha) concha Solsky

Cassida concha Solsky, 1872, Horae Soc. Ent. Ross., 8:264[1]; Kraatz, 1879, Deutsche Ent. Zeits., 23:269. (Type in Moscow Museum.)

Cassida (Mionycha) concha Weise, 1893, Ins. Deutschl., 6:1090; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (129[2]); 1914, Col. Cat., 62:96[3]; 1926, Best.-Tab. Eur. Col., 95:51[4]; Chujo, 1934, Sylvia, 5:167.

Dorsal surfaces yellow, deeper yellow on outer two interpunctural areas of elytral discs; ventral surfaces black except for borders of abdominal segments; legs yellow; antennae yellow with apices slightly darkened.

Dorsal outline circular; body strongly convex, vertically declivitous posteriorly. Pronotum nearly twice as broad as long, impunctate; lateral angles briefly rounded-obtuse; located at middle in longtitudinal sense. Elytra slightly swollen at suture behind scutellum, a transverse swelling extending to second interpunctural area on each side; discs coarsely seriate-punctate; interpunctural areas narrow, last two wider; explanate margins with coarse, scattered punctures. Length 5 mm.; breadth 4 mm.

Distribution: Siberia[1] (Amur[2]; Ussuri[3,4]); Japan[4] (Honshu).

Subgenus Cassida Linnaeus, *sensu stricto*

Body oblong or elongate-oval in dorsal outline, rarely ovate, not very strongly convex. Frontoclypeal area trapeziform. Antennae short, rarely reaching beyond humeral angles, thickened distally. Pronotum transverse, generally broadest near base. Elytra subparallel-sided. Tarsal claws untoothed, not completely hidden.

Subgenerotype: *Cassida nebulosa* Linnaeus (Palearctic region).

Range: Largely Palearctic, extending into Oriental and Ethiopan regions.

Key to the Chinese Species of Cassida sensu stricto

1. Elytra regularly seriate-punctate, without any punctures in central portion between third and fourth puncture-rows 2

— Elytra not regularly seriate-punctate throughout, at least with some extra punctures between third and fourth puncture-rows 7

2.(1) Explanate margins of elytra not distinctly thickened at borders in central portion 3

— Explanate margins of elytra strongly thickened at borders in central portion; dorsum yellowish brown with fine black speckling; pronotum broadly rounded at sides ..... *C. nebulosa*

3.(2) Pronotum narrowly rounded or subacute at sides, not broadly rounded; lateral angles anterior to middle, or near base 4

— Pronotum broadly rounded at middle of each side; frontoclypeal area impressed with deep converging oblique grooves 5

4.(3) Lateral angles of pronotum rounded-angulate, located near base; elytral discs and explanate margins rather steeply declivitous at sides; venter generally pale ..... *C. berolinensis*

— Lateral angles of pronotum subacute, placed slightly anterior to middle; elytral discs and explanate margins not steeply declivitous at sides; venter black ..... *C. nucula*

5.(3) Head strongly narrowed anteriorly 6

— Head subtrapeziform; body evenly convex, with regular puncture-rows; humeral angle practically touching middle of side of pronotum ..... *C. klapperichi*

6.(5) Explanate margins of elytra lacking black marking; body one-fourth again as long as broad; elytral discs generally reddish brown, sometimes with numerous longitudinal lines and spots of black ..... *C. japana*

— Explanate margin of each elytron with a posterolateral black mark; body nearly one-half again as long as broad; elytral discs always partly black at sides ..... *C. piperata*

7.(1) Head black; body only rarely as much as one-third as deep as broad 8

— Head reddish, coarsely punctured; body fully two-fifths as deep as broad; second interpunctural area of each elytron strongly raised; pronotum broadly rounded laterally, reddish; elytra red or black ..... *C. pallidicollis*

8.(7) Dorsal surfaces contrastingly marked with distinct discal spots on elytra, including one on each humeral callus, or with pronotal and elytral discs largely black and explanate margins shiny yellow 9

— Dorsal surfaces not contrastingly marked in dried specimens, generally reddish yellow or greenish on explanate margins as well as discs 10

9.(8) Pronotal and elytral discs almost entirely black; humeral angles subacute; body less than one-third again as long as broad ..... *C. probata*

— Dorsum reddish with suture and about six spots on each elytral disc black; humeral angles rounded; body fully one-half again as long as broad ..... *C. lineola*

10.(8) Legs completely black; elytra with short bristle-like hairs; labrum broadly and shallowly emarginate apically; explanate margins sharp-edged 11

— Legs not entirely black, though femora sometimes black basally; explanate margins not very sharp-edged 15

11.(10) Frontoclypeal area fully as broad as long; body slightly more than one-third as deep as broad; lateral angles of pronotum distinctly angulate; elytral discs generally lacking transverse rugae 12

— Frontoclypeal area about one-fourth again as long as broad; body less than one-third as deep as broad; explanate margins subhorizontal; lateral mar-

gins of pronotum broadly rounded; elytral discs with several irregular subtransverse rugae; dorsum largely black or rusty brown ..... *C. mongolica*

12.(11) Prothorax narrower than elytral humeri; elytra subparallel-sided, not widened behind humeri 13

— Prothorax as broad as elytral humeri; elytra widened behind humeri; elytral punctures not very regular; discs clouded; explanate margins pale ..... *C. laticollis*

13.(12) Pronotum strongly tapering and distinctly angulate at each side; frontoclypeal area as long as broad; anterior margin of humeral angle thickened and raised 14

— Pronotum moderately tapering, obtusely rounded at each lateral angle; frontoclypeal area broader than long; anterior margin of humeral angle not thickened and raised ..... *C. sikanga*

14.(13) Elytra without a distinct tubercle behind scutellum, feebly concave near scutellum; pronotal angles behind middle; length of body about 6 mm.; breadth 4 mm. ..... *C. fuscorufa*

— Elytra with a distinct tubercle behind scutellum, distinctly concave beside scutellum; pronotal angles near middle; length of body 7–8 mm.; breadth 5.5–6.5 mm. ..... *C. jacobsoni*

15.(10) Interpunctural areas of elytral discs lacking minute hairs 16

— Interpunctural areas of elytral discs with minute white hairs; form elongate-oval; pronotum subsemicircular, closely meeting base of elytra; explanate margins of elytra less than one-third as wide as discs ..... *C. mandli*

16.(15) Frontoclypeal area distinctly longer than broad 17

— Frontoclypeal area fully as broad as long 18

17.(16) Explanate margins of elytra fully one-half as broad as discs at middle; pronotum as broad as elytra, evenly arcuate anteriorly ..... *C. rubiginosa rugosopunctata*

— Explanate margins of elytra barely one-third as broad as discs at middle; pronotum narrower than elytra, obtusely rounded-angulate anteriorly ..... *C. rubiginosa taiwana*

18.(16) Pronotum much narrower than elytra, with lateral margins rounded near middle of each side 19

— Pronotum as broad as elytra, or practically so, with lateral margins narrowed and subacute, the angles placed close to base; elytral discs subregularly punctured, with interpunctural areas slightly raised and for most part slightly broader than puncture-rows ..... *C. prasina*

19.(18) Humeral angles broadly rounded, a free space between them and lateral angles of pronotum; labrum broadly emarginate; length of body 7 mm.; breadth 5 mm. ..... *C. spaethi*

— Humeral angles subacute, slightly produced, closely meeting basal margin of pronotum; labrum narrowly emarginate; length of body 6 mm.; breadth 4 mm. ..... *C. stigmatica*

Cassida (s. str.) **berolinensis** Suffrian

Cassida obsoleta HERBST *(not* Illiger), 1799, Natursyst. Käf., 8:248, pl. 131, fig. 5.

Cassida berolinensis SUFFRIAN, 1844, Stett. Ent. Ztg., 5:270[1]; BOHEMAN, 1854, Mon. Cassid., 2:458; KRAATZ, 1874, Berl. Ent. Zeits., 18:94; WEISE, 1889, Horae Soc. Ent. Ross., 23:571[2]; SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (142)[3]. (Type in Stettin Museum (?).)

Cassida daurica BOHEMAN, 1854, Mon. Cassid., 2:457[4].

Cassida berolinensis ab. *pallidiventris* REITTER, 1912, Fauna Germ., 4:215[5].

Cassida berolinensis ab. *pectoralis* WEISE, 1896, Wien. Ent. Ztg., 15:81[6].

Cassida (Cassida) berolinensis, SPAETH, 1926, Best.-Tab. Eur. Col., 95:32[7].

Dorsal surfaces yellowish brown, sometimes with elytral suture black on basal quarter, three black spots on disc of each elytron and sutural angles black; ventral surfaces and antennae brownish to reddish, sometimes thoracic sterna and central portions of abdominal sterna black.

Briefly ovate. Pronotum broadest close to base, very slightly narrowed behind lateral angles, closely and finely punctured; explanate margins fairly declivitous, punctured on inner portions and with a row of punctures parallel to margin. Elytra strongly convex, with regular rows of deep punctures and no punctures in interspaces; second interspace wider than others, sides raised slightly; steeply declivitous. Length 3.5–5 mm.; breadth 2.5–4 mm.

China: Mongolia[2] (Ordos). September.

Distribution: Europe[1,3,5,6]; Mongolia; eastern Siberia[4,7].

Cassida (s. str.) **fuscorufa** Motschulsky

Cassida fuscorufa MOTSCHULSKY, 1866, Bull. Soc. Nat. Mosc., 39, 1:178[1]; KRAATZ, 1879, Deutsche Ent. Zeits., 23:268, 273[2]; GORHAM, 1885, Proc. Zool. Soc. London, 1885:282 *(fusco-rufa)*; SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (138); 1926, Best.-Tab. Eur. Col., 95:36[3]; YOKOYAMA, 1931 (Col. Japan), 2:19, pl. 3, fig. 5; CHUJO, 1934, Sylvia, 4:177[4]; 1938, Mushi, 11:168[5]; GRESSITT, 1938, Lingnan Sc. Jl., 17:587[6]; 1939, Pan-Pac. Ent., 15:142[7]. (Type in Moscow Museum (?).) Spaeth, 1942, Arb. morphol. taxon. Ent. Berlin-Dahlem, 9:12 (Erzendjanzsy).

Cassida consociata BALY, 1874, Trans. Ent. Soc. London, 1874:213[8].

Cassida russata, WEISE *(not* Fairmaire, 1887), 1889, Horae. Soc. Ent. Ross., 23:646.

Dorsal surfaces dull reddish brown, paler and slightly transparent on explanate margins; ventral surfaces black except for parts of pro- and mesothoracic pleura and borders of abdomen; antennae partly black on scape, red on next five segments and black on last five; legs black with tarsi partly reddish.

Dorsal outline oval, very slightly broader anteriorly than posteriorly; body about two-fifths as deep as wide. Head closely punctured. Antennae

gradually thickened, not quite reaching humeri. Pronotum not quite twice as broad as long, obtusely angulate laterally, evenly arcuate anteriorly, sinuate basally, finely punctured on both disc and explanate margins. Elytra distinctly raised along suture, each with ten or twelve subregular rows of punctures, with second and fifth (fourth posteriorly) interspaces more strongly raised than others, and explanate margins irregularly punctured. Length 5.5–6.2 mm.; breadth 3.7–4.2 mm.

Some (Lingnan) Chang-ting, Shaowu, Pu-si, January-May, Maa; An-yuen, Djou.

China: Hopei (?) ("Oo Oo" Bay[8]); Shantung (Lao Shan[5]); Kiangsu (Nanking[7]); Kiangsi (Kuling[6], An-yuen); Chekiang (Hangchow[7]); Fukien (Chang-ting, Shaowu); Manchuria (Erzendjanzsy); Taiwan[4]. May-June.

Distribution: Eastern Siberia (Amur[2]); eastern China; Korea[3]; Taiwan; Japan[1].

Cassida (s. str.) **jacobsoni** Spaeth

(Plate 29, figure 5)

Cassida Jacobsoni Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (138)[1]. (Type in Spaeth collection.)

Cassida (Cassida) jacobsoni Spaeth, 1926, op. cit., 95:36.

Dorsal surfaces rust-red, elytral discs somewhat darker; ventral surfaces and legs black; antennae black with scape and apex of last segment reddish.

Head rugose, indistinctly punctured. Prothorax transversely subhexagonal; pronotal disc very coarsely, but shallowly punctured. Elytra broader basally than prothorax, humeri fairly prominent, rounded, sides slightly broadened to before middle, then narrowed, discs bluntly tuberculate behind scutellum and with large, shallow, seriate punctures, a deep basal groove between second and fifth puncture-rows, another posteriorly external to fourth interspace; interspaces with short, erect hairs. Length 7–8 mm.; breadth 6.5 mm.

Many (Lingnan) Shaowu, Chungan, Chang-ting, April-June, Maa; Kuatun, Klapperich; (Heude) Tien-mu Shan.

China: Fukien ("Kuatien"[1], Kuatun, Shaowu, etc.); Chekiang (Tien-mu).

Distribution: Southeast China.

Cassida (s. str.) **japana** Baly

(Plate 33)

Cassida japana Baly, 1874, Trans. Ent. Soc. London, 1874:212[1]; Kraatz, 1879, Deutsche Ent. Zeits., 23:273; Spaeth, 1914, Col. Cat., 62:103[2]; 1914, Verh. Zool.-Bot. Ges. Wien, 64: (Sitzb.): (130); 1914, Suppl. Ent., 3:19[3];

1926, Best.-Tab. Eur. Col., 95:31[4]; CHUJO, 1934, Sylvia, 5:174[5]; GRESSITT, 1939, Pan-Pac. Ent., 15:142[6]; SPAETH, 1940, Kol. Rundschau, 26:37[7]. (Type in British Museum.)

Cassida rugifera KRAATZ, 1879, Deutsche Ent. Zeits., 23:274[8].

Cassida piperata var. *japana*, WEISE, 1900, Arch. f. Naturg., 66, 1:295.

Cassida lineola, GRESSITT *(not* Creutzer), 1938, Lingnan Sc. Jl., 17:387[9], 587[10].

Dorsal surfaces entirely ochraceous brown, paler on explanate margins, or with elytra marked with many vaguely defined or coalescent spots or short longitudinal lines of black; ventral surfaces black; legs largely pale; antennae generally pale.

Dorsal outline rounded-oblong; body about one-third as deep as broad. Pronotum oval, about twice as broad as long, broadly rounded laterally; disc finely punctured; explanate margins slightly irregular. Elytra with suture moderately raised a short distance behind scutellum; disc of each regularly and closely punctured in about ten rows, second and fourth interspaces moderately raised, with a few transverse connectives; explanate margins about one-third as wide as discs, declivitous at an angle of about 40 degrees. Length 5–5.5 mm.; breadth 4–4.5 mm.

Many (Lingnan) Shaowu, Wingan, Chungan, Bohea Hills, April-June, Maa; Pe-pei, Lichuan, Lung-tau Shan, Loh-chang, July-August, Djou & Tsang; (Ac. Sin.) Bao-hwa Shan; (A.M.N.H.) Yen-ping, July, 1917, H. Caldwell; (M.C.Z.), Foochow, April, 1886, Leech; Chin-cheng Shan, July, 1932, G. Liu.

Host: *Alternanthera sessilis* R. Br. (Canton).

China: Szechuan[4] (Chin-cheng Shan, Pe-pei); Hupeh (Lichuan); Kiangsu (Shanghai[7]); Anhwei (Bao-hwa Shan); Chekiang (Tunglu, Mokan Shan[6]); Kiangsi (SE.[9]); Kwangtung (Yao Shan, Canton[10], Lung-tau Shan, Loh-chang); Fukien (Yen-ping, Shaowu, Wingan, Foochow, etc.); Taiwan[3,5] (mountains of northern and central part). Year round at Canton.

Distribution: Japan[8] (Kyushu[1,6]; Shikoku[5]; Honshu[6]); South China; Taiwan; Indo-China[2,4].

This species is intermediate between the subgenera *Cassida* and *Taiwania* in some respects, particularly as regards the body form, though the tarsal claws are not very distinctly toothed and the explanate margins are barely hyaline.

Cassida (s. str.) **klapperichi** Spaeth

(Plate 29, figure 3)

Cassida Klapperichi SPAETH, 1940, Koleopt. Rundschau, 26:37[1].

Strongly and evenly convex, evenly rounded-oval; entirely testaceous brown, very slightly darker on summit of elytra.

Frontoclypeal area trapeziform, subrounded apically. Pronotum broadly

rounded at sides in male, almost angulate laterally in female, finely punctured on disc and explanate margin. Elytra evenly convex, broadened behind bases, rather regularly seriate-punctate, hardly depressed on basal triangle; humerus angulate, projecting forward, nearly touching margin of pronotum; explanate margin more finely and irregularly punctured. Length 5–6 mm.; breadth 3.75–4.25 mm.

Some (Lingnan) Pu-si, April, Maa; (Heude) Zikawei, June.

China: Kiangsu (Shanghai[1], Zikawei); Hunan (Pu-si).

Distribution: Eastern China.

Cassida (s. str.) **laticollis** Gressitt, new species

(Plate 30, figure 7)

Somewhat opaque pale brownish testaceous; pronotal and elytral discs in part irregularly pitchy brown; head pitchy black; antenna testaceous on first five segments, reddish on sixth and pitchy black on remainder; thoracic and abdominal sternites pitchy black, testaceous on lateral borders; legs pitchy black.

Head round; frontoclypeal area trapeziform, as broad as long, somewhat irregular, transversely raised near middle, not distinctly punctured. Antenna barely reaching to humerus, moderately thickened distally; second segment fairly large; third slightly longer than second; fourth subequal to second, more slender; fifth equal to fourth; sixth slightly shorter; seventh strongly thickened; eighth to tenth each about as broad as long; eleventh nearly twice as long as tenth, stout, tapering, not very acuminate. Prothorax more than twice as broad as long, somewhat unevenly obtusely rounded anteriorly, moderately angulate just behind middle of each side; disc gradually declivitous on each side from median raised area, flat or depressed at edges; disc in part irregularly and shallowly punctured or uneven; explanate margin more extensively, and likewise shallowly, punctured. Scutellum equilaterally triangular, slightly convex in center. Elytra no broader than prothorax at humeri, very slightly broadened towards middle of body, feebly narrowed posteriorly, broadly rounded apically, one-third as deep as broad; suture rather distinctly raised, particularly just behind scutellum; disc of each with about ten not very regular rows of punctures of varying sizes, mostly narrower than interspaces, which are in part slightly raised longitudinally, with a few oblique or transverse raised lines; basal triangle moderately concave posteriorly; a feeble depression on each side anterior to middle and a shallow longitudinal one external to fifth puncture-row; explanate margin somewhat steeply declivitous laterally, a little more flattened, but fairly narrow, posteriorly; humeral angle somewhat squarish, close to lateral angle of prothorax. Ventral surfaces rather feebly wrinkled or punctured. Length 6 mm.; breadth 4.4 mm.

Holotype, female (?) (California Academy of Sciences), **Suisapa**, altitude 1,000 meters, **Lichuan District, western Hupeh Province, West China,** July 24, 1948, Gressitt.

Differs from *C. jacobsoni* Spaeth in being narrower, with the explanate margins of elytra more declivitous, the prothorax more strongly convex and obtuse in outline of anterior margin, with the disc more uniformly punctured and smoother and more depressed at sides and the coloration different.

Cassida (s. str.) **lineola** Creutzer

(Plate 29, figure 6)

Cassida lineola CREUTZER, 1799, Ent. Vers.: 119, pl. 2, fig. 23[1]; SUFFRIAN, 1844, Stett. Ent. Ztg., 5:210; BOHEMAN, 1854, Mon. Cassid., 2:450; FAIRMAIRE, 1888, Revue d'Ent., 7:157[2]; SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (138); 1914, Col. Cat., 62:104[3]; 1926, Best.-Tab. Eur. Col., 95:34; CHUJO, 1934, Sylvia, 5:175.

Cassida russica HERBST, 1799, Natursyst. Käf., 8:232, pl. 131, fig. 1 ♂[4].

Cassida signata HERBST, 1799, l. c.: 234, pl. 131, fig. 2 ♀[5].

Cassida sibirica GEBLER, 1833, Bull. Soc. Nat. Mosc., 6:306[6]; KRAATZ, 1874, Berl. Ent. Zeits., 18:97; 1879, Deutsche Ent. Zeits., 23:267.

Cassida bicostata FISCHER, 1842, Cat. Col. Sib. Or. Karel.: 24 ♀[7].

Cassida suturalis FISCHER, 1842, l. c. ♂8.

Cassida nigroguttata GORHAM, 1885, Proc. Zool. Soc. London, 1885:281[9].

Cassida nigrostrigata FAIRMAIRE, 1888, Revue d'Ent., 7:157[10].

Cassida lineola ab. *russica*, SPAETH, 1914, Col. Cat., 62:104.

Cassida lineola var. *sibirica*, SPAETH, 1914, l. c.

Cassida lineola ab. *nigrostrigata*, SPAETH, 1914, l. c.

Cassida lineola ab. *formosana* CHUJO, 1934, Sylvia, 5:172, 176[11].

In life green with shiny silvery lines. Dried specimens: Dorsal surfaces bright red to reddish brown, marked with black; pronotum unicolorous, red or reddish brown; scutellum red or partly black; elytra black along suture and very narrowly along basal margins; disc of each with several bold elongate-oval black spots in two longitudinal lines, second starting with a spot on humeral callus, or with feeble blackish streaks; ventral surfaces and legs black or reddish brown.

Body oblong-oval in dorsal outline, rounded anteriorly and posteriorly, fully one-third as deep as broad. Pronotum fully twice as broad as long in male, not quite twice as broad as long in female, strongly rounded anteriorly, slightly sinuate basally; lateral angles obtuse, very close to base; surface entirely covered with dense punctures; elytra as broad as, or slightly broader than, pronotum, hardly raised on suture behind scutellum; disc of each deeply punctured in about 12 partly confluent rows; explanate margins about one-fifth as broad as discs, declivitous and shallowly punctured.

Antennae fairly stout, thicker distally, barely reaching humeral angles. Length 5.8–7.8 mm.; breadth 4.5–5.4 mm.

Several (M.C.Z.) Chang-yang, 1,500 meters, near Ichang, July, 1887, A. E. Pratt; Ping-loo, G. Liu; North China; (U.S.N.M.) Foochow; (Heude) Yangkiaping.

Hosts: *Artemisia* sp., *Beta vulgaris* Linn. (Europe).

China: Chahar (Yangkiaping); Hopei (Peiping[2,10]); Hupeh (Chang-yang); Mongolia[3]; Fukien (Foochow); Kwangsi (Ping-loo); eastern China[3], Taiwan (Hokuseki[11]). March to July.

Distribution: Eastern Europe[1,4,5]; Siberia[3,6,7,8]; China; Japan[3] (Honshu[9]); Taiwan.

The writer feels that all of the above aberrational or varietal names are to be considered as synonyms since they are all based on color characters which appear in different parts of the range of the species and do not represent geographical subspecific characters. Certain of the color forms are more dominant in particular areas and therefore no doubt have a genetic basis, but apparently there has not been sufficient isolation of populations to allow raciation to proceed to the point of production of recognizable subspecies.

Cassida (s. str.) **mandli** Spaeth

(Plate 29, figure 7)

Cassida (Cassida) Mandli SPAETH, 1921, Koleopt. Rundschau, 9:84[1]; 1926, Best.-Tab. Eur. Col., 95:37 (synopsis). (Type in Spaeth collection.)

Dorsum dirty ochaceous brown, slightly paler on lateral portions of elytral discs; ventral surfaces of body, including head and coxae, black; abdomen bordered with pale reddish; legs, including trochanters, yellowish; antennae ochraceous with distal five segments pitchy black.

Body elongate-oval in dorsal outline, nearly one-half again as long as broad and slightly less than one-third as deep as broad, almost equally declivitous anteriorly and posteriorly. Pronotum somewhat less than twice as broad as long, obtusely rounded anteriorly; lateral angles subacute, touching humeral angles of elytra; surface entirely, and rather closely, punctured. Elytra no broader than pronotum basally, slightly broader at middle, subacute apically and non-tuberculate at summit; disc of each in part regularly punctured; punctures in about 12 rows, third to fifth rows and ninth to eleventh rows somewhat confused. Length 6.5 mm.; breadth 4.2 mm. According to Spaeth the male measures 6 x 4.3 mm. and the female 7 x 4.5 mm.

Some (Heude) Hsiao-ling, July, 1937; Antung, June, 1931.

China: Manchuria (Hsiao-ling, Antung).

Distribution: Ussuri[1]; northeastern China.

Cassida (s. str.) mongolica Boheman

Cassida mongolica BOHEMAN, 1854, Mon. Cassid., 2:449[1]; KRAATZ, 1879, Deutsche Ent. Zeits., 23:268[2]; SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (130, 139)[3]; 1926, Best.-Tab. Eur. Col., 95:35[4]; CHUJO, 1934, Sylvia, 5:177. (Type in Stockholm Museum.)

Cassida russata FAIRMAIRE, 1887, Revue d'Ent., 6:335[5].

Reddish brown to entirely black above except for a pair of pale spots at middle of anterior border of pronotum; black with five basal segments reddish.

Short, ovate; moderately convex. Prothorax as wide as elytra; sides obtusely angulate anterior to base; medially convex, coarsely and densely rugulose-punctate, smoother in middle. Elytra with humeri angulate; discs coarsely and irregularly substriate-punctate, first three rows fairly regular with intervals slightly raised but interrupted; fourth interval more strongly raised behind middle; explanate margins punctate; humeri obliquely costate. Length 7.5–8 mm.; breadth 4.8–6 mm.

China: Monogolia[1]; Hopei (Peiping[5]); Shantung (Kiautschou[3]).

Distribution: Eastern Siberia[2]; North China; northern Japan[4].

Cassida (s. str.) nebulosa Linnaeus

Cassida nebulosa LINNAEUS, 1758, Syst. Nat., ed. 10:363[1]; 1767, ed. 12; 1, 2:575; 1761, Fauna Suec., ed. 2:152; OLIVIER, 1808, Ent., 6:979; 97, pl. 2, fig. 31; STEPHENS, 1831, Ill. Brit. Ent., 4:367; SUFFRIAN, 1844, Stett. Ent. Ztg., 5:277; BOHEMAN, 1854, Monogr. Cassid., 2:451; BALY, 1874, Trans. Ent. Soc. London, 1874; 213[2]; KRAATZ, 1879, Deutsche Ent. Zeits., 23:267, 270[3]; GORHAM, 1885, Proc. Zool. Soc. London, 1885:282[4]; MATSUMURA, 1907, Thousand Ins. Japan, 4:40, pl. 58, fig. 36 ♀; SPAETH, 1926, Best.-Tab. Eur. Col., 95:30; YOKOYAMA, 1931 (Col. Japan), 2:19, pl. 3, fig. 3; MATSUMURA, 1931, 6,000 Illus. Ins. Japan: 226, fig. 622; Yuasa, 1932, in Nippon Konchu Zukan: 586, fig. 1146; CHUJO, 1934, Sylvia, 4:172; LIU, 1936, Lingnan Sc. Jl., 15:259[5]; 1938, Mushi, 11:168[6]; GRESSITT, 1938, Lingnan Sc. Jl., 17:588[7]; 1939, Pan-Pac. Ent., 15:142[8]. (Type in the collection of the Linnean Society of London.)

Cassida affinis FABRICIUS, 1775, Syst. Ent.: 88[9].

Cassida maculata FABRICIUS, 1775, l. c.[10].

Cassida tigrina DEGEER, 1775, Mem. Ins., 5:168, pl. 5, figs. 15, 16[11].

Cassida nigra HERBST, 1799, Natursyst. Käfer, 8:258, pl. 131, fig. 12[12].

Dorsal surfaces testaceous brown, slightly reddish brown on pronotal disc; elytra marked with numerous small black dots or short longitudinal lines, some slightly larger black spots on inner portions of explanate margins in posterior half; antennae testaceous brown basally, pitchy apically; ventral surfaces black, abdomen with testaceous margin; legs with femora except apices pitchy black, remainder testaceous to pitchy. Body evenly oval; prothorax one-half as long as broad and rounded at sides; pronotum en-

tirely punctured, a few swellings on disc; elytra entirely punctured, discs with regular rows of punctures separated by less than their diameters. Length 5–7.5 mm.; breadth 4.3–4.7 mm.

Some (Ac. Sin.) Manchuli and Pokotu, July; (C.A.S.) Kiangsu, July, 1923, Van Dyke collection; (U.S.N.M.) "O Er," 2,500–3,000 meters, near Weichow, August 6–18, D. C. Graham; (Heude) Hsiao-ling, June, 1937.

Hosts: *Atriplex* sp., *Chenopodium* sp., *Convolvulus* sp. (Europe), *Beta vulgaria* Linn. (Japan), thistles (Europe and Japan).

China: Manchuria[8] (Mukden, Hsiao-ling); Hupeh (Hwang-mei[7]); Shantung (Lao Shan[6]); Kiangsu[5]; Szechuan (O-er). May to August.

Distribution: Europe[1,9,10,12]; Siberia[3,11]; North China[2]; Korea; Japan[2,4].

Cassida (s. str.) nucula Spaeth

Cassida nucula Spaeth, 1914, Ent. Mitt., 3:228[1]. (Type in Spaeth collection.)

Reddish yellow; moderately shiny; each elytron with two pitchy spots on second interstice behind middle; ventral surfaces black except for head, femoral apices, tibiae, tarsi, antennae and outer margin of abdomen.

Rounded-subquadrate, feebly convex. Prothorax more than twice as broad as long, transversely elliptical; lateral angles subacute, placed barely anterior to middle of prothorax; disc and explanate margin finely but distinctly punctured. Elytra one-sixth broader than prothorax, weakly emarginate basally; humeri moderately prominent, subacute; sides subparallel; discs moderately swollen, feebly concave in basal triangle, regularly striate-punctate; suture feebly raised behind scutellum; explanate margins declivitous, finely rugulose-punctate. Length 4 mm.; breadth 3.5 mm.

China: Yunnan[1].

Distribution: Southwestern China.

Cassida (s. str.) pallidicollis Boheman

(Plate 29, figure 4)

Cassida pallidicollis Boheman, 1856, Cat. Col. Ins. Brit. Mus., 9:138[1]; 1862, Mon. Cassid., 4:340; Fairmaire, 1888, Revue d'Ent., 7:158[2]; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (130, 139)[3]; 1926, Best.-Tab. Eur. Col., 95:32; Doi, 1927, Dobutsug. Zasshi, 39:335, 337; Matsumura, 1931, 6,000 Illus. Ins. Japan: 226, fig. 623, female; Chujo, 1934, Sylvia, 5:175. (Type in Stockholm Museum.)

Cassida diabolica Kraatz, 1879, Deutsche Ent. Zeits., 23:142[4].

Cassida (Mionycha) Morawitzi Jacobson, 1894, Horae Soc. Ent. Ross., 28:245[5].

Cassida pallidicollis ab. *morawitzi*, Spaeth, 1942, Arb. morphol. taxon. Ent. Berlin-Dahlem, 9:12 (Erzendjanzsy, Manchuria).

Pronotum pale reddish brown; scutellum brown to pitchy; elytra almost entirely black to reddish brown tinged with pitchy near humeri and irreg-

ularly along suture or on disc; ventral surfaces reddish brown to black with brown legs and abdominal borders.

Dorsal outline rounded-oval, slightly longer than broad; strongly convex, steeply declivitous posteriorly. Prothorax nearly twice as broad as long, broadly rounded laterally, rugose-punctate. Elytra at bases slightly broader than prothorax; humeri subrounded, not very prominent; discs densely subseriate-punctate, second interspace strongly carinate, connecting anteriorly with slightly raised suture behind scutellum and with middle of base; explanate margins shallowly and coarsely rugose-punctate. Length 5.6–6.2 mm.; breadth 4.5–5 mm.

Specimens (Heude) Shanghai, Cheng-kiang, Zo-ce, April-May; (M.C.Z) Peiping, July, 1937, Kiu-hua Shan, September, 1932. K. C. Liu; (C.A.S.) Nanking, June; Mukden, August, 1923, E. C. Van Dyke; (A.M.N.H.) Tai-yuan-fu.

China: Mongolia[3]; Manchuria (Mukden); Hopei (Peking[2]); Shansi (Tai-yuan); Anhwei (Kiu-hua Shan); Kiangsu (Nanking). April to September.

Distribution: China[1] (northern and eastern); Korea[3]; eastern Siberia[4]; western Siberia[5].

Cassida (s. str.) **piperata** Hope

Cassida piperata HOPE, 1842, Proc. Ent. Soc. London, 1:62[1]; 1845, Trans. Ent. Soc. London, 4:12; BOHEMAN, 1862, Mon. Cassid., 4:322; WEISE, 1900, Arch. f. Naturg., 66, 1:295; SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (130)[2]; Suppl. Ent., 3:19[3]; 1926, Best.-Tab. Eur. Col., 95:30[4]; CHUJO, 1934, Sylvia, 5:174[5]; 1936, Mushi, 11:169[6]; GRESSITT, 1939, Pan-Pac. Ent., 15:143[7]. (Type in British Museum.)

Cassida labilis BOHEMAN, 1854, Mon. Cassid., 2:402[8].

Cassida biguttulata KRAATZ, 1879, Deutsche Ent. Zeits., 23:275[9].

Coptocycla sparsa GORHAM, 1885, Proc. Zool. Soc. London, 1885:284[10].

Dorsal surfaces testaceous, slightly reddish on pronotal disc; marked with black behind center of pronotum and irregularly on elytral discs, particularly at sides; elytral explanate margins each with a black patch on posterolateral portion and a narrower patch at suture; ventral surfaces black; head, antennae, and legs testaceous.

Oval in dorsal outline, broadly rounded anteriorly and posteriorly, widest at middle; moderately convex. Pronotum transversely oval, about twice as broad as long, broadly rounded at sides, densely punctured on disc. Elytra with humeri declivitous, slightly projecting beyond sides of pronotum, rounded-squarish; disc densely punctured in regular rows, with alternate interspaces more strongly raised, in part. Length 4–5.4 mm. breadth 3.3–3.6 mm.

Some (Lingnan) Shaowu, Chungan, Chang-ting, Maa; Canton; (W.C.U.U.) Paohsin, July, D. S. Pen; (M.C.Z.) Peking, July, 1932, Gaines Liu; (C.A.S.) Riran; (U.S.N.M.) Kyoto, Donckier collection; Yachow, 1,500 meters, June, 1929, D. C. Graham.

Host: *Alternanthera sessilis* R. Br. (Canton).

China: Hopei (Peking); Shantung (Tsingtau[6]); Kiangsu (Nanking[7]); Fukien (Shaowu, Chungan, Chang-ting); Kwangtung (Canton); Sikang (Yachow, Paohsin); Formosa[3,5] (Taihorin, Bakurasu, Hori, Karenko, Taihoku, Riran). Year-round at Canton.

Distribution: North[4] and eastern China[1,8]; Taiwan; eastern Siberia[9]; Korea[4]; Japan[1,2,10]; Tonkin[4]; Luzon[4].

Cassida (s. str.) prasina Illiger

Cassida prasina ILLIGER, 1798, Käfer Preuss., 1:481[1]; WEISE, 1893, Ins. Deutschl., 6:1081, 1101; REITTER, 1912, Fauna Germ., 4:218; SPAETH, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (146)[2].

Cassida viridana HERBST, 1799, Natursyst. Käfer, 8:224[3] (excl. illus.).

Cassida chloris SUFFRIAN, 1844; Stett. Ent. Ztg., 5:188[4]; BOHEMAN, 1854, Mon. Cassid., 2:384; KRAATZ, 1874, Berl. Ent. Zeits., 18:92.

Cassida sanguinolenta var. *prasina*, DESBROCHERS, 1891, Mon. Cassid. (Frelon): 40.

Cassida (Cassida) prasina, SPAETH, 1926, Best.-Tab. Eur. Col., 95:50.

Dorsal surfaces green; posterior part of pronotum shiny silvery; basal portions of elytra often blood-red with shiny silvery raised areas; ventral surfaces black; legs greenish.

Body rounded-ovate. Pronotum with lateral angles acute, placed near base. Elytra seriate-punctate, with weakly raised longitudinal ridges. Length 4.3–6.0 mm.; breadth 3–4 mm.

One (C.A.S.) Karuisawa, Honshu, Japan, July 1–5, 1950, Gressitt.

Host: *Achillea millefolium* Linn. (Europe).

China: Sinkiang (Tien Shan, Ala-tau[2]).

Distribution: Europe[1,3,4]; central Asia[2]; Japan (Honshu).

Cassida (s. str.) probata Spaeth

Cassida probata SPAETH, 1914, Ent. Mitt., 3:277[1]. (Type in Spaeth collection.)

Shiny; dorsal surfaces yellow with pronotal and elytral discs almost entirely black; ventral surfaces black with coxae yellow; head black; antennae yellow basally, pitchy beyond middle.

Rounded in dorsal outline, slightly longer than broad; moderately convex. Prothorax about one-half again as broad as long, elliptical, transversely symmetrical, rounded at lateral angles; disc smooth with fine scattered

punctures. Elytra but slightly broader at bases than prothorax; humeri slightly produced, subacute, forming right angles; disc feebly impressed in basal triangle, with hardly a suggestion of a postscutellar tubercle, but with some of interspaces raised, forming a weak reticulation; punctures fairly large and not very regular; explanate margins weakly rugulose-punctate. Claws simple. Length 6 mm.; breadth 4.7 mm.

China: Yunnan[1].

Distribution: Southwestern China.

Cassida (s. str.) **rubiginosa rugosopunctata** Motschulsky

Cassida rugosopunctata MOTSCHULSKY, 1866, Bull. Soc. Nat. Mosc., 39, 1:177[1]; KRAATZ, 1879, Deutsche Ent. Zeits., 23:273. (Type in Moscow Museum ?.)

Cassida erudita BALY, 1874, Trans. Ent. Soc. London, 1874:212[2]; KRAATZ, 1879, Deutsche Ent. Zeits., 23:273.

Cassida rugoso-punctata, GORHAM, 1885, Proc. Zool. Soc. London, 1885:281.

Cassida rubiginosa WEISE, 1900, Arch. f. Naturg., 66, 1:294.

Cassida rubiginosa var. *rugosopunctata*, SPAETH, 1914, Col. Cat., 62:109; 1926, Best.-Tab. Eur. Col., 95:44[3]; YOKOYAMA, 1931 (Col. Japan), 2:18, pl. 3, fig. 2; CHUJO, 1934, Sylvia, 5:177[4].

Dorsal surfaces brownish green to distinct pale green with scutellum, bases of elytra near scutellum and extreme outer borders of explanate margins of prothorax and elytra brownish; antennae with basal half reddish testaceous and distal half pitchy black; ventral surfaces of body black; legs largely black on femora, reddish testaceous on coxae, tibiae, and tarsi.

Body fairly flat, even in dorsal outline. Prothorax nearly as broad as elytra at base. Dorsum entirely punctured, including explanate margins, subseriately so on elytra. Length 7–7.8 mm.; breadth 5.8–6.5 mm.

Several (C.A.S.) Hangchow, May, 1923, Nanking, April-May, E. C. Van Dyke; (A.M.N.H.) Yen-ping, Spring, 1915, Caldwell; (M.C.Z.) Changyang, 1,500 meters, near Ichang, July, 1887, A. E. Pratt.

China: Fukien (Yen-ping); Chekiang (Hangchow); Kiangsu (Nanking); Hupeh (Ichang); Tibet[3].

Distribution: Tibet; East China[3]; Korea[3]; Saghalien[4]; Japan[1] (Hokkaido[4]; Honshu[1,2]).

Cassida (s. str.) **rubiginosa taiwana** Gressitt, new subspecies

Dorsal surfaces dull brownish green; borders and punctures of elytral explanate margins paler; elytral disc with extreme base from inner edge of humeral callus to scutellum and suture along basal fifth reddish brown, presumably brighter red in life; remainder of suture very narrowly brownish;

ventral surfaces of body black; posterolateral border of abdomen reddish testaceous; legs reddish brown with coxae, trochanters and femora to just before apices, black; antenna reddish brown, blackish on scape and pitchy on last five segments.

Body oblong-oval in dorsal outline, fairly narrow and subparallel-sided, about one-third as deep as wide. Head about as long as broad; frontoclypeal area trapeziform, slightly longer than broad, flat and distinctly punctured. Antenna hardly reaching to posterolateral angle of pronotum, distinctly thickened slightly beyond middle; third segment fully one-half again as long as second and slightly longer than fourth; fourth longer than fifth or sixth. Pronotum not quite as broad as elytra at humeri, nearly twice as broad as long, strongly rounded anteriorly; lateral angles subrounded-angulate, nearly right angles, very near base in longitudinal sense; basal margin sinuate; disc and explanate margin hardly differentiated on surface, deeply and closely punctured. Scutellum triangular, longer than broad. Elytra distinctly longer than broad, subparallel-sided, very slightly wider just before middle than at bases; suture hardly raised behind scutellum; disc of each elytron with about 12 subregular rows of fine punctures, the interspaces partly punctate and the rows completely confused posterolaterally; second interspace somewhat raised; explanate margins about one-third as wide as discs, declivitous at an angle of about 35 degrees, irregularly punctured. Ventral surfaces of body finely and sparsely punctured. Length 7.6 mm.; breadth 4.7 mm.

Holotype, probably a male (California Academy of Sciences), **Pianan-Ambu**, altitude 1,900 meters, **southwest of Tai-ping Shan (Taiheizan), Tai-chung District, northcentral Taiwan**, May 11, 1932, Gressitt.

Differs from *C. r. rubiginosa* Müller in being less oval, more nearly parallel-sided, with the humeri slightly broader than the pronotum, the pronotal disc more coarsely punctured and the elytral discs more densely and less regularly punctured, and from *C. rubiginosa rugosopunctata* Motsch. in being narrower, more nearly parallel-sided, more densely punctured on the pronotum and with the explanate margins of the elytra narrower. The new subspecies differs from both the above in being more brownish and less greenish in the dried state.

Distribution: Taiwan.

Cassida (s. str.) **sikanga** Gressitt, new species

(Plate 30, figure 8)

Somewhat shiny reddish brown; antenna testaceous on basal half, pitchy black distally, with base of scape pitchy and apex of last segment slightly pale; head black; frontoclypeus reddish pitchy; thoracic and abdominal

sternites pitchy black, the latter testaceous on outer borders; legs pitchy black.

Head subrounded; frontoclypeal area trapeziform, slightly broader than long, subrounded anteriorly, irregularly punctured, with bordering groove narrow; vertex medially grooved, a slight forward projection on each side of front of occiput. Antenna reaching slightly beyond humeral angle, slender basally, thickened distally; second segment two-thirds as long as scape; third a little longer than second, barely longer than fourth; fifth as long as fourth, slightly longer than sixth, which is slightly thickened distally; seventh to tenth much thicker; tenth nearly as broad as long; eleventh twice as long as tenth, tapering in distal half. Prothorax almost twice as broad as long, transversely subelliptical, but somewhat sinuate basally, with prescutellar projection prominent and emarginate-truncate; anterior margin subevenly convex; lateral angles subobtusely rounded, placed just behind middle in longitudinal sense; disc subevenly convex, slightly irregular, in large part subcoarsely though shallowly punctured, but smoother, finely punctured and less raised on supracephalic area, slightly concave just anterior to scutellum; explanate margin nearly flat except anteriorly, forming a shallow concavity on each side in connection with sides of disc, subevenly impressed with moderate, distinct punctures. Scutellum subequilateral; basal margin slightly convex in outline. Elytra subparallel-sided, narrowed and broadly rounded posteriorly; humeral angle of each rounded, projecting only slightly forward, not very close to lateral angle of prothorax; suture moderately raised behind scutellum; disc with ten subregular rows of moderate punctures, mostly narrower than interspaces, and with some partial transverse corrugations; some extra punctures in basal triangle and between third and fourth puncture-rows anterior to middle, both of which areas are depressed; also a shallow sublongitudinal depression in area of fifth to seventh puncture-rows posterior to middle; explanate margin moderately declivitous, somewhat wrinkled or uneven, but with punctures fine or indistinct. Ventral surfaces and legs moderately wrinkled or punctured. Length 6.3 mm.; breadth 4.4 mm.

Holotype (West China Union University), **Pao-hsin, Sikang Province, West China,** July 8, 1939, Miss D. S. Pen.

Differs from *C. fuscorufa* Motsch. in being relatively broader and less convex, with the pronotum flat at sides, less convex, with its lateral angles more rounded and placed more nearly at middle in longitudinal sense and with the elytra more evenly convex and more finely punctured; and from *C. jacobsoni* Spaeth in having the explanate margins a little narrower, the elytra less strongly raised behind scutellum and the pronotal explanate margin more rounded at sides and more sparsely punctured.

Distribution: West China.

Cassida (s. str.) spaethi Weise

Cassida spaethi Weise, 1900, Deutsche Ent. Zeits., 1900:458[1]; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (130)[2]; 1914, Col. Cat., 62:111[3]. (Type in Zoological Museum of Berlin ?.)

Cassida stigmatica, Kraatz *(not* Suffrian), 1879, Deutsche Ent. Zeits., 23:267[4].

Cassida Kraatzi Weise, 1900, Arch. f. Naturg., 66:295[5].

Cassida (Cassida) Spaethi, Spaeth, 1926, Best.-Tab. Eur. Col., 95:46.

Cassida spaethi subsp. *mandschukuoensis* Spaeth, 1942, Arb. Morph. Tax Ent. Berlin-Dahlem, 9:13[6].

Green, shiny; ventral surfaces black; antennae (except clubs), legs and borders of abdomen testaceous.

Broadly ovate, fairly convex. Prothorax short, transversely subelliptical, rounded laterally, punctate. Elytra evenly emarginate and crenulate basally, prominent at humeral angles, strongly seriate-punctate on discs with second interspace elevated. Length 6–7 mm.; breadth 5 mm.

I have not seen this species and do not know whether two subspecies are involved in China or not. In naming *C. s. mandschukuoensis,* Spaeth stated that the typical form was found in Ussuri, Amur, Vladivostok and Korea (Seishin).

China: Mongolia[2]; Manchuria[6] (Erzendjanzsy).

Distribution: North China; Siberia (Amur[1,4,5], Askold[3]); Korea[3].

Cassida (s. str.) stigmatica Suffrian

Cassida stigmatica Suffrian, 1844, Stett. Ent. Ztg., 5:206[1]; Boheman, 1854, Mon. Cassid., 2:385; Kraatz, 1874, Berl. Ent. Zeits., 18:88; Reitter, 1912, Fauna Germ., 4:217; Spaeth, 1914, Col. Cat., 62:111[2]; 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (146)[3]; Wu, 1937, Cat. Ins. Sin., 3:922. (Type in Stettin Museum ?.)

Cassida Brucki (Becker ms.) Gemminger & Harold, 1874, Cat. Col., 12:3658[4].

Cassida fenestrata (Megerle ms.) Gemminger & Harold, 1874, l. c.[5].

Cassida singularis (Sturm ms.) Gemminger & Harold, 1874, l. c.[6].

Cassida sanguinolenta var. *stigmatica*, Desbrochers, 1891, Mon. Cassid. (Frelon):24.

Cassida (Cassida) stigmatica, Spaeth, 1926, Best.-Tab. Eur. Col., 95:46.

Dorsal surfaces green with bases of elytra splotched with blood-red; ventral surfaces black; legs greenish.

Ovate; strongly convex. Pronotum with lateral angles broadly rounded and surfaces densely and strongly punctured. Elytra broader than pronotum; humeri prominent; disc of each seriate-punctate with interpunctural areas forming weak longitudinal ridges; second interspace strongly raised anteriorly. Length 5–6 mm.; breadth 3.5–4 mm.

Host: *Achillea millefolium* Linn. (Compositae).

China: Sinkiang (Tien Shan, Kuldja[3]).

Distribution: Central Europe[1,4,5,6]; central Asia; Siberia[2].

Subgenus **Odontionycha** Weise

Odontionycha WEISE, 1891, Wiener Ent. Ztg., 10:204; 1893, Ins. Deutschl., 6:1074; BEDEL, 1898, Faune Col. Bassin Seine, 5:207; SPAETH, 1912, Ann. Mus. Nat. Hung., 10:498; 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (135); 1926, Best.-Tab. Eur. Col., 95:23, 24.

Body broad and fairly flat, elongate-ovate in dorsal outline, narrowed posteriorly. Pronotum strongly transverse, rounded near middle of each side, feebly convex. Elytra feebly raised behind scutellum, irregularly punctured; explanate margins punctured, slightly declivitous, not very distinctly set off from discs. Antennae just reaching to humeral angles, thickened distally. Tarsal claws large, toothed basally, barely reaching beyond end of third tarsal segment.

Subgenerotype: *Cassida viridis* Linneaus (Palearctic region).

Range: Palearctic and Ethiopian regions.

This subgenus hitherto contained two Palearctic species and several inhabiting Africa, most of them in South Africa.

KEY TO THE CHINESE SPECIES OF ODONTIONYCHA

1. Dorsal body outline oblong-oval, hardly broader at humeri than posterolaterally; body nearly one-half as deep as broad; color pale testaceous in dried specimens ..... *O. inflata*

— Dorsal body outline ovate, much broader anteriorly than posteriorly; body about one-third as deep as broad; color greenish ..... *O. viridis*

Cassida (Odontionycha) inflata Gressitt, new species

(Plate 30, figure 9)

Dried specimen: Pale whitish straw-color, very pale brownish on part of posterior portion of elytral disc; head partly pitchy, pale on center and lateral borders of frontoclypeal area; antennae brownish on scape, pale on next four and one-half segments, pitchy black on remainder, but apex of last segment partly paler; ventral surfaces pitchy along middle, testaceous to brownish at sides; legs pitchy reddish brown. Dorsum glabrous.

Head round; eyes large; frontoclypeal area subtrapeziform, broader than long, in outline slightly convex at apex, somewhat concave at base, with about 20 distinct punctures; labrum depressed and emarginate apically. Antenna slender, barely reaching to humeral angle; scape stout, nearly twice as long as second segment; third segment distinctly longer than second, barely longer than fourth; fifth equal to fourth; sixth shorter, flattened and broadened distally; seventh to tenth subequal, flattened and broadened, nearly as broad as long; last barely twice as long as tenth, somewhat flattened,

tapering from just beyond middle. Prothorax a little less than twice as broad as long, distinctly narrower than elytra, somewhat evenly convex in anterior outline, broadly rounded at each side, emarginate-truncate at middle of base; disc somewhat gradually declivitous from median line, concave on each side of center, indistinguishably merging with explanate margin, the whole set with fairly close, small distinct punctures. Scutellum triangular, slightly broader than long, slightly convex in outline on each side, irregularly punctured. Elytra broad, slightly widened behind humeri, broadly rounded posteriorly, strongly raised along suture behind scutellum in a large arch, in side view evenly declivitous from summit to extreme apex and somewhat evenly, though more gradually, declivitous from summit to anterior margin of prothorax; disc of each elytron rather smooth and even, finely, and in large part irregularly, punctured; basal margin narrowly black, crenulated; explanate margin moderately inclined anteriorly, forming a wide angle with side of disc, more sparsely and heavily punctured than disc; humerus produced somewhat forward, rounded, approaching middle of side of pronotum. Ventral surfaces moderately wrinkled or punctured; prosternum with large shallow punctures. Length 7 mm.; breadth 5.2 mm.

Holotype (California Academy of Sciences), **Suisapa,** altitude 1,000 meters, **Lichuan District, western Hupeh Province, West China,** July 25, 1948, Gressitt.

Differs from *C. viridis* Linn. in being more evenly oblong-oval in dorsal outline and much more convex in lateral outline, nearly one-half as deep as broad, in having the prothorax much more broadly rounded at sides, more convex and more punctate on disc and the elytra with discs more finely punctured and explanate margins smoother and more distinctly punctured.

Distribution: Westcentral China.

Cassida (Odontionycha) viridis Linnaeus

Cassida viridis Linnaeus, 1758, Syst. Nat., 10, 1:362[1]; Reitter, 1912, Fauna Germ., 4:213, pl. 150, fig. 11 a-b; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (135); 1926, Best.-Tab. Eur. Col., 95:25[2]; Matsumura, 1931, 6,000 Illus. Ins. Japan: 266[3], fig. 624; Chujo, 1934, Sylvia, 5:166. (Type in collection of the Linnean Society of London.)

Cassida equestris Fabricius, 1787, Mant. Ins., 1:62[4]; Gorham, 1885, Proc. Zool. Soc. London, 1885:281[5]; Matsumura, 1907, 1,000 Ins. Japan, 4:39, pl. 68, fig. 35; Yokoyama, 1930 (Col. Japan), 1:29, pl. 3, fig. 7.

Dorsal surfaces pale green: pronotum partly brownish green on disc, yellowish on borders, and part of anterior portion, of explanate margin; elytra with discal punctures on outer borders of discs slightly brownish and explanate margins with outer borders and punctures yellowish; ventral

surfaces black with borders of pro- and mesothorax and abdomen reddish brown; antennae reddish brown with last four segments pitchy.

Dorsal outline somewhat kite-shaped: obtuse anteriorly and narrowed posteriorly; body flattened, less than one-third as deep as wide. Pronotum almost three-fifths as broad as long, obtusely convex anteriorly, subsinuate basally; lateral angles broadly rounded and placed somewhat behind middle; surfaces entirely punctured. Elytra one-fourth broader than pronotum, widest just anterior to middle; humeri rounded, somewhat declivitous and almost forming an even line with margin of pronotum; discs feebly raised at suture behind scutellum, finely and irregularly punctured; explanate margins one-half as wide as discs, slightly declivitous, also punctured. Length 8–10 mm.; breadth 6.3–7 mm.

Not yet recorded from China, though listed from Siberia, Japan, and northern Asia.

Hosts: *Salvia, Stachys, Mentha, Galeopsis, Lycopus, Circium* spp[2] (Europe).

Distribution: Europe[1,4]; Siberia[2]; Japan (Honshu[3,5]; Hokkaido[3]).

Subgenus **Cassidulella** Strand

Cassidula Weise *(not* Humphrey, 1797), 1889, Wiener Ent. Ztg., 8:260; 1891, op. cit., 10:204; 1893, Ins. Deutschl., 6:1076; Spaeth, 1926, Best.-Tab. Eur. Col., 95:24, 53; Chujo, 1934, Sylvia, 5:165, 169.

Cassidulella Strand, 1928, Ent. Nachr. Bl., 2:2 (n. n.).

Body slender, strongly convex; dorsal outline narrowly oval. Antennae short, moderately thickened, reaching humeral angles. Pronotum broader than long, convex anteriorly, subtransverse along basal margin of disc; lateral angles rounded-obtuse, at middle of sides. Elytra much longer than broad, hardly broader than pronotum, seriate-punctate with punctures in third inter-punctural area; explanate margins strongly declivitous. Tarsal claws untoothed. Middle coxal cavities close.

Subgenerotype: *Cassida vittata* Villers (Palearctic region).

Range: Palearctic region.

Key to the Chinese Species of Cassidulella

1. Head reddish yellow; femora largely testaceous; pronotum closely and finely punctured, broadest anterior to middle; elytra with discal punctures finer than marginal punctures ..... *C. parvula*

— Head black; femora black except for apical portions; pronotum closely and coarsely punctured, broadest at middle; elytra with discal punctures heavier than those of explanate margins ..... *C. velaris*

Cassida (Cassidulella) parvula Boheman

Cassida parvula Boheman, 1854, Mon. Cassid., 2:428[1]; Weise, 1889, Horae Soc. Ent. Ross., 23:571, 646[2]; 1893, Ins. Deutschl., 6:1082[3]; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): 146[4]. (Type in Stockholm Museum.)

Cassida navicula Boheman, 1854, Mon. Cassid., 2:429[5].

Cassida comparata Rybakow, 1889, Horae Soc. Ent. Ross., 23:289[6]; Jacobson, 1910, Revue Russe d'Ent., 10:60.

Cassida (Cassidula) parvula, Spaeth, 1926, Best.-Tab. Eur. Col., 95:57[7]; Chujo, 1938, Mushi, 11:168[8].

Pale yellow dorsally; elytra each with a silver stripe; ventral surfaces black, except for labrum, antennae, femora, tibiae, tarsi, and borders of abdomen which are straw yellow.

Form elliptical, rather strongly convex. Prothorax subsemicircular, rounded at posterolateral angles, finely punctured; elytra regularly and deeply punctate-striate, second interspace with a narrow shiny silver stripe, explanate margins punctured. Length 4.5–5 mm.

China: Sinkiang (Kuldja[4]); Tsinghai (Kokonor, Amdo[6]); Mongolia[1] (Ordos[2]); Hopei (Tientsin[7]); Shantung (Lao Shan[8]). June.

Distribution: Caspian Sea[5]; Central Asia (Turkestan, etc.); North China; Siberia[3].

Cassida (Cassidulella) velaris Weise

Cassida velaris Weise, 1896, Deutsche Ent. Zeits., 1896:281; Spaeth, 1914, Verh. Zool.-Bot. Ges. Wien, 64 (Sitzb.): (146)[2]. (Type in Berlin Museum ?.)

Cassida (Cassidula) velaris, Spaeth, 1926, Best.-Tab. Eur. Col., 95:54[3]; Chujo. 1934, Sylvia, 5:169.

Pale testaceous; suture and elytral punctures pitchy; ventral surfaces of body black; tibiae, tarsi, apices of femora and external margins of sternites testaceous.

Body elliptical in dorsal outline, strongly convex. Head punctate; triangular portion of frontoclypeal area terminating in a deep, narrow groove anteriorly. Pronotum deeply punctured; lateral angles rounded-obtuse, at middle of sides. Elytra convex, sides of disc and explanate margins steeply declivitous; disc regularly and deeply punctured, with extra punctures in third interpunctural area. Length 4.8–5.2 mm.; breadth 3.2 mm.

One (U.S.N.M.) Kyoto, Honshu.

China: Tsinghai (Kokonor[2]).

Distribution: Eastern Siberia[1] (Ussuri[3]); Tsinghai; Japan[2] (Honshu).

Subgenus **Tylocentra** Reitter

Tylocentra REITTER, 1926, in Spaeth and Reitter, Best.-Tab. Eur. Col., 95:24, 57.

Body strongly convex, oval or ovate in dorsal outline. Elytra slightly tuberculate at summit, declivitous at sides; explanate margins steeply declivitous, extending below venter, forming a cavity. Ventral surfaces of body green or yellow. Middle coxae widely separated. Tarsal claws widely divergent, untoothed.

Subgenerotype: *Cassida virguncula* Weise (Mongolia); by present designation.

Range: Southern Palearctic (Asia Minor to North China).

KEY TO THE CHINESE SPECIES OF TYLOCENTRA

1. Elytra with a distinct tubercle at summit; basal triangle of each elytron distinctly impressed; interpunctural rows wider than punctures 2
— Elytra lacking a distinct tubercle at summit; basal triangle of each elytron not distinctly impressed; puncture-rows entirely regular, wider than interpunctural areas ..... *T. deltoides*

2.(1) Dorsal outline triangular-ovate, subangulate posteriorly; body slightly more than one-half again as long as broad; lateral angles of pronotum obtuse, slightly anterior to middle; elytral explanate margins feebly punctured ..... *T. lenis*
— Dorsal outline nearly circular; but slightly longer than broad; lateral angles of pronotum bluntly angular, located at one-third distance from base to apex; elytral explanate margins indistinctly punctured ..... *T. virguncula*

Cassida (Tylocentra) deltoides Weise

Cassida deltoides WEISE, 1889, Horae Soc. Ent. Ross., 23:571, 644[1]; SPAETH, 1914, Col. Cat., 62:101. (Type in Berlin Museum.)

Cassida (Tylocentra) deltoides, SPAETH, 1926, Best.-Tab. Eur. Col., 95:58.

Grass-green in life; somewhat shiny; basal triangle of elytra blood-red; dried specimens dirty green, brownish on pronotum and sides of elytra; head with convergent arcuate dark lines on frons.

Body but slightly longer than broad, ovate, strongly convex. Prothorax transversely almost elliptical, twice as broad as long, posterior angles fully rounded and surfaces shallowly rugose-punctate. Elytra subacutely produced at humeri, nearly reaching forward to transverse axis of pronotum, slightly broadened behind humeri to middle, strongly and deeply seriate-punctate with narrow, equal interspaces; suture raised behind scutellum, forming a plane anterior triangle, concave on each side of scutellum. Length 4.5–5 mm.

China: Mongolia (Ordos[1]). Late September.

Distribution: Northwestern China.

Cassida (Tylocentra) lenis Spaeth

Cassida (Tylocentra) lenis SPAETH, 1926, Best.-Tab. Eur. Col., 95:59[1]. (Type in Spaeth collection, Manchester.)

Greenish yellow, shiny, with red spots on suture and tubercle.

Body deep, strongly convex. Prothorax as broad at base as elytral bases, rounded anteriorly, with bluntly rounded sides, widest slightly anterior to middle. Elytra regularly and coarsely seriate-punctate; basal triangles feebly impressed; elytral explanate margins with small obsolescent punctures. Length 6 mm.; breadth 4 mm.

China: "China (Singley)"[1]. Presumably northwestern China.

Distribution: Northwestern China.

Cassida (Tylocentra) virguncula Weise

Cassida virguncula WEISE, 1889, Horae Soc. Ent. Ross., 23:571, 645[1]; WU, 1937, Cat. Ins. Sin., 3:922[2]. (Type in Berlin Museum.)

Cassida (Tylocentra) virguncula, SPAETH, 1926, Best.-Tab. Eur. Col., 95:58.

Brilliant green in life; dried specimens brownish yellow, shiny. Short, oval, broadest in basal third of elytra and from there regularly narrowed to posterolateral angles; body moderately convex. Prothorax nearly twice as broad as long, subsemicircular, with rounded posterolateral corners, feebly punctured, shiny; elytra with a flattened basal triangular area, slightly concave on each side of scutellum, regularly punctate-striate on discs, interspaces flattish, broader than puncture-rows and minutely punctulate, humeral angles moderately produced, subacute, and explanate margins as steeply declivitous as discs and moderately closely punctured. Length 4.3–4.8 mm.

China: Shansi[1]; Mongolia[2]. June.

Distribution: Northwestern China.

BIONOMICS

The habits of the tortoise beetles are somewhat unusual, just as are the phenomena of the ephemeral golden irideseence and the broadly expanded lateral margins of the pronotum and the elytra in the adults.

Though the "parasol"-bearing larvae, or "peddlers" are familiar to many, it is perhaps not so generally known that the subfamily Cassidinae is one of the very few groups of insects, aside from the Blattaria and Mantodea, in which the females construct papery oothecae with which to protect their eggs. Furthermore, certain members of the Cassidinae are among the

very few insects which lay their eggs attached to the ends of filaments, though in these beetles the eggs are pendant from the under surfaces of leaves, rather than standing erect on their stiff pedicels as in the Chrysopidae.

The oothecae of the Cassidinae exist in many different forms. Some consist of layers of papery material attached to each other at one end, others of individual transparent capsules, some of conglomerations of frothy material, some are filamentous as described above, and some appear like wax or amber, imbedding the eggs. All types are attached almost invariably to the under leaf surface of the host plant. Many types of oothecae have a smaller or greater amount of the mother's feces placed on top to further camouflage them. A key to the known oothecae of Chinese tortoise beetles follows the life history data.

The larvae all have a caudal appendage with muscular attachment, located above the anus. The latter is also highly muscular and is telescopically protrusible, often for at least one-half the length of the body. This is correlated with the ability to attach the feces to various parts of the accumulated exuviae, or to the caudal furca in the first instar larva. In some forms the exuviae are not fastened to the caudal furcae, being discarded, and the feces are formed into long filaments attached to the furcae. In still others the exuviae are closely matted, not covering most of the dorsum of the body, and the feces are attached to them in long, spreading filaments or massed filaments. The larvae always have lateral processes or spines arranged along the sides of the thoracic and abdominal segments. The normal arrangement for each side is three for the prothorax, three on the mesothorax, two on the metathorax, and one for each abdominal segment. They continue along the sides of the abdomen generally to the eighth segment, and the caudal furca or supraanal process represents, at least in analogy, the fused processes of the ninth abdominal segment. A key to the known larvae of Chinese Cassidinae follows the key to oothecae.

The pupae are in some respects very similar in appearance to the larvae. They are generally of the same usually green or brown color, are similarly dorsoventrally compressed, have fringing appendages around the borders, and usually have the same exuvial-fecal armature of the larvae with the addition of the exuviae of the fifth instar. Thus the pupae similarly possess the caudal furcae, which in some cases appear to be separated at their insertions. The lateral appendages of the abdomen frequently are in the form of broadly expanded plates with fringing spinules, or appear as long, sinuous spines. The appendages of the prothorax frequently consist of numerous short filaments or a few longer ones, though sometimes they are entirely lacking. The meso- and metathoraces have the wings substituted for the larval appendages. A key to the known Chinese pupae follows the key to larvae.

Life History of Aspidomorpha furcata (Thunberg) at Canton

(Plates 31, 32, and plate 36, figures 1, 4, and 7)

Host plants: This species attacks sweet potato *(Ipomoea Batatas* Lamk.), swamp cabbage *(Ipomoea Aquatica* Forsk.) and morning-glory *(Ipomoea cairica* Sweet and *Ipomoea digitata* Linn.)

Prevalence: During the warmer parts of the year the larvae and adults are very abundant, and destruction is extensive. It is common to see one-quarter or more of the leaf surfaces eaten by these beetles, sometimes assisted by the other two Canton sweet potato tortoise beetles discussed below. The adults are definitely diurnal, being most active as to flying and mating in the sunshine, though spending much of their time during the hottest part of the day on the undersides of the leaves, where most of the feeding and mating takes place. Egg-laying is likewise largely done during the day-time, on the under surfaces of the leaves. The larvae feed continuously, day and night, except for short intervals for rest and longer periods, of several hours or more, for molting.

Generations: The maximum number of generations is eight or nine per year, the life-cycle in the warmer seasons occupying four and one-half weeks and in the winter from six to eight weeks or much longer. In the case of cold winters (the temperature dropping to within a few degrees of freezing) development may actually cease and a sort of hibernation consisting of inactivity take place. The generations are irregular and overlapping, so that at almost any time the beetles may be found in all stages of development.

Eggs: The eggs are laid in small egg-cases (pl. 30, figs. 1, 2) on the under surfaces of the leaves. The cases are 3–3.5 mm. long and 2–2.75 mm. wide. The adult female produces a thin papery brown substance which is formed into oblong-oval slightly corrugated sheets which are glued at one end in layers to the leaf surface, one egg being laid between every two sheets, except for an extra sheet, smaller than the others, at both bottom and top. The position of each egg differs in regard to the rest, from side to side, to make for compactness, the corresponding sheets varying in width and position accordingly. The case may contain from one to eight eggs, and perhaps occasionally nine, but generally two to five, with the average about four. Table I will indicate the numbers of eggs hatched from 48 egg cases in reared groups. Fourteen egg cases obtained in captivity contained eggs as follows: two eggs (nine egg cases); three eggs (three cases); four eggs (one case); five eggs (one case); average, 2.57 eggs per case. Another group of 26 egg cases laid in captivity contained an average of 3.15 eggs per case. A group of 60 egg cases obtained by random collecting in the field contained an average of 4.028 eggs per case. Of this group 12.8 per cent of the eggs were found to be parasitized. It would seem that fewer eggs per case are laid in captivity. The egg stage lasts from 3.75 to 5.75 days in summer and from 5 to 10 days or more in winter.

TABLE I
Egg cases of *Aspidomorpha furcata*

Egg cases	Eggs hatched	Number of eggs per case		
		Maximum	Minimum	Average
2	8	5	3	4
7	17	4	..	2.47
4	12	4	2	3
9	24	3	2	2.6
10	31	5	2	3.1
3	10	4	3	3.33
2	7	4	3	3.5
8	26	5	2	3.25
3	8	3	2	2.66
Total average per egg case				3.06

Larvae: There are five larval instars. The larva emerges by chewing the end of the thin membrane-like sac containing the ovum, and crawling out from the open free end of the egg case. The fully formed larva, with its spines folded backward along each side of its body, may be found in the egg some hours before the actual emergence takes place. Feeding begins shortly after the larva makes its exit from the case and the young larva eats only the under side of the leaf, not indulging in any of the upper epithelium till after the first molt takes place. During the second and following instars the larvae may eat holes of various sizes through the leaves, as do the adults. During feeding and locomotion, the larva may suddenly raise its caudal appendage when disturbed. Molting takes place after a rest of a few hours, and commences when the skin splits along the median line. This is pushed backwards as the larva crawls out until the skin is folded and rolled onto the end of the new caudal furca, with the previous caudal furca or furcae projecting from the distal end. Each successive molt is similar and the old larval skins, each larger than the preceding, form segments of the tapering "parasol" supported by the new caudal furca.

The first stadium lasts from one and three-fourths to three days in the warmer seasons, averaging about two days or so, and may last six days or longer in winter. The second generally lasts a few hours less than the first stadium, but may be as long as nine days or more in winter. The third and fourth each average about two and one-half days in length for all seasons, and the fifth somewhat over six days, including the prepupal period of two or three days. During the prepupal period no food is taken, the larva attaches the posterior end of its body to the surface of the leaf, and the transformations commence under the larval skin, the fully formed pupa being revealed with the molting of the skin of the fifth instar. In table II the lengths of the various stages in different seasons are tabulated from data on reared groups, and averaged.

Table II

Length of life-stages of *Aspidomorpha furcata* in days

No.	Month	Egg	Larval stadia I	II	III	IV	V	Pupa	Egg to adult	Adult
9–98	Aug.	4.5	2	2	2.3	2	5.5	4.5	22.8	15–234
9–123	"	5	2	2	2	2	5	4	22	"
9–124	"	4.5	2	2	2	2	5	4	21.5	"
9–161	"	4.7	2.5	2	3	2.5	5	4	23.7	"
9–180	"	4.7	1.7	2.5	3	2.3	3.7	4.3	23.3	"
9–182	"	4.7	2	2	2	3	5	4.3	23.0	"
9–190	"	5	1.7	1.7	1.7	1.7	5	4.2	22.2	"
9–193	"	4.7	2.2	2.2	1.5	2.7	4	4	21.5	"
9–196	"	4.7	2	1.7	1.7	2	5	4	22.2	"
9–210	"	4.6	2	2	2	2	4.7	4	21.4	"
9–213	Sept.	4.6	2	2	2	2	4.5	4	21.1	"
9–220	"	4.5	2	2	2	2	5	4	21.5	"
9–228	"	3.7	3	2.5	1.5	2	5	4.2	22	"
9–240	"	4	2.5	1.7	2	2	5	4	21.2	"
9–255	"	4.5	1.7	1.7	1.5	2.5	5	4	21	30–98
9–293	"	4.5	2	2	3	2	6	5	24.5	30–98
9–350	"	5	2	2	3	3	5	10	30	15–158
9–607	Nov.	5–8	5	5	4	4	30	13	64.5	10–15
9–614	"	6–7	3	2	2	2	8	17	40.5	10–15
0–339	Dec.	13	5	6	4	4	10	13	55	—
1–21	April	5	3.5	2.5	3	2.2	5.5	4.5	26.2	—
1–38	June	5	4	3	2	3	4	5	26	—
M–6	"	6	6	6	2	2	5.5	6	33.5	148
M–10	"	5	3	2	2	3	6	5	26	75 (♀)
M–10A	"	5	3	2	3	3	6	5	27	129 (♂)
M–10L	"	6	2	3.5	1.5	3	8	5	29	—
Averages		5.1	2.6	2.5	2.5	2.6	6.3	5.3	26.9	121

Pupa: The pupa remains attached to the leaf surface with the "parasol" generally held horizontally over the body although it is sometimes held erect or stretched backwards. It is quiescent except for an occasional raising of the anterior portion of the body on its hinged posterior end. This generally happens when the pupa is disturbed, and its frequency increases as the time of metamorphosis to the adult approaches. The pupa is similar to the mature larva in appearance, being very flat, largely green and possessing the same "parasol," though this structure is increased in size by the addition of the molted skin of the fifth instar larva, part of which, however, is beneath the pupa. The principal difference is the broad rounded pronotal shield and the flattened lateral extensions of the abdominal segments. The pupal stage averages a little more than five days in length, generally four days or barely over in the warm seasons (table II).

Adult: The adult emerges from the pupa by a splitting of the pupal exoskeleton across the pronotum near its anterior margin and along the median dorsal line of the thorax. The process of emergence takes about 15 minutes, and when this is completed the elytra are fully formed but the beetle is white in color. During the following several hours it gradually takes on its natural coloration, though it does not display its normal shining appearance of burnished gold for three to six days or more, and until it has been exposed to sunshine. During this period the adults are fairly quiescent, but toward its close feeding commences. Mating was first observed to take place six days after emergence. The life of reared adults averaged 121 days, with the greatest length 285 days for males and 371 days for females.

Mating is continued at frequent intervals and lasts for long periods, although much of the time the female moves about and even feeds with the male simply riding on her back, the copulating organs retracted. During the first several days these activities may occupy a considerable portion of the time.

The earliest recorded egg-laying took place five days after the first observed mating, and 11 days after metamorphosis to the adult stage. Egg cases are constructed daily, or almost daily, henceforth, generally until a day or two before the death of the female, and number from one to eight, or possibly more, per day. The length of the egg-laying period varies from a few weeks up to nearly a year. For 13 recorded females the egg-laying period varied from 20 to 356 days, and the average was 79.2 days. The number of eggs laid by a single female may well exceed one thousand.

In the case of the egg-laying record of one female, eggs were laid for 118 days, from June 10 to October 5, 1942. A total of 324.5 oothecae were constructed, an average of 2.75 per day. The oothecae contained an average of 1.87 eggs each.

From eight selected reared females, four mated in August, two in September, one in November, and one in June, the following information was obtained on oviposition: The average length of the egg-laying period was ten weeks, the extremes nine and sixteen weeks. The average number of egg cases laid was 128, or 1.7 per day. The total number of egg cases laid per individual varied from 63 to 228. The average number laid per day varied from 1.1 to 3. The maximum per day varied from 3 to 7 for the different individuals, the average maximum being 4. The average numbers of egg cases per female per week for the first eight weeks (eight females) were as follows: 11 oothecae; 9.9; 10.5; 10.5; 12.4; 16.6; 13.9; 15.2. In the ninth week (seven females) the average was 16.1; in the tenth week (four females) the average was 15.0; in the eleventh week (three females) the average was 14.3 oothecae. The maximum number of oothecae laid in one week was 38. From the figures for the average number of eggs laid in the

first to eleventh weeks of the egg-laying periods of these females, it cannot be judged for certain whether the number of eggs laid per week increases toward, and past, the middle of the life of the female, or whether more eggs are laid in the fall, or in cooler weather, since most of the groups recorded commenced laying in August.

Description of Stages

Egg: (Plate 31, figure 1) Pale yellowish cream color. Slender, elliptical, dorsoventrally compressed, subacute at each end.

First instar larva: (Plate 31, figure 3) Pale greenish white to pale testaceous; body surface fairly transparent; spines whitish testaceous. Head flattened and subrounded, with a row of five small round black ocelli, one of which is out of line, on each side. Body broadly oval, moderately flattened dorso-ventrally and edged along each side with 16 tapering fleshy spines, each bearing several hairlike spinules along its sides and a long one at its apex. In addition to these, there is a caudal furca extending from dorsal surface of the penultimate abdominal segment. Its arms are longer than the body in newly hatched larvae and nearly as long as the body in larvae ready to molt. They are sinuate in the form of a lyre and each bears several oblique spinules externally. Sometimes feces are borne on the furca. The anus is a long fleshy cylinder capable of being telescoped.

Second instar larva: (Plate 31, figure 4) Very similar to first instar except for presence of molted skin of latter on caudal furca in the form of a transverse structure formed of two obliquely placed oval forms fringed externally by shorter body spines, said structure preceded by molted skin of head-capsule bordered by longer body spines with caudal furca projecting from distal end. Spiracles visible as small colorless erect cylinders on sides of dorsum.

Third instar larva: (Plate 31, figure 5; plate 36, figure 7) Pale testaceous, sometimes tinged with greenish. Similar to second instar except for additions to "parasol" of molted skin of latter, same as that of first instar except for larger size. Head capsule tending to be partly hidden by folding under pronotum both during feeding and rest.

Fourth instar larva: (Plate 31, figure 6) Greener than the preceding and having the molted skin of the latter added to the caudal appendage.

Fifth instar larva: (Plate 31, figure 7; plate 32, figure 1) Broadly ovate, dorsoventrally compressed; lateral margins with long spine-bearing processes; caudal furcae bearing four sets of exuviae, each united to the next by the respective furcal shells, the entire structure held horizontally over the body, or at times tilted upward or backward, reaching to or beyond anterior end of body. Head not visible from above. Prothorax nearly one-

half as long as broad (excluding processes), slightly emarginate at middle of anterior margin, bearing three long, tapering-cylindrical, translucent, almost colorless processes on each side, each about as long as one-half transverse width of segment and bearing numerous pitchy, pale-based spines; disc with a pair of submedian rows of small pitchy spines, and a large, irregular blackish crescent-shaped area on each side, slightly convex, and more distinctly defined posteriorly; first spiracle just anterior to posterior margin, near side, its opening consisting of a small blackish ring. Mesothorax four times as broad as long, bearing three processes at each side, similar to those of prothorax; disc with a very few brownish hairlike spines on central portion. Metathorax very similar to mesothorax, slightly broader laterally, with two processes at each side. First abdominal segment widest in middle, bearing at each side a single large process similar to those of thorax and a slightly raised cylindrical dark-edged spiracle on dorsal surface near anterior border some distance in from the external margin; the following segments similar but with spiracles gradually smaller and closer to external margin, spines of sixth and seventh segments longer than the others, those of fourth shortest.

Pupa: (Plate 32, figures 2–3) Body largely green or pale green with expanded portions of thorax and abdomen transparent and colorless, those of latter pitchy at tips; eyes black; mandibles and tarsal claws reddish to pitchy black; an oblong area around each spiracle and a narrow transverse line extending mediad near posterior margin of each respective segment testaceous brown to pitchy; "parasol" dirty testaceous. Coloration darker as metamorphosis approaches, except for general green color of body, which fades to pale cream color. Head well retracted beneath pronotum, broadly fused to thorax; antennae and legs sunken in surrounding areas, forming a fairly smooth ventral surface; pronotum broader than rest of body, twice as broad as long, somewhat evenly rounded along margin and bordered with about 22 or 23 pairs of small fleshy spines, the fourth and eighth or thereabouts from the middle on each side about twice as large as others; discal surfaces of thorax smooth; first five abdominal segments each bearing at either side a broad tapering strongly acuminate lateral process with slender marginal spinules and an erect cylindrical spiracle slightly inward from lateral margin of tergum. Caudal end of abdomen attached to leaf by means of molted skin of fifth instar larva, with spines of latter forming a broad radiating fringe.

Adult: (Plate 32, figure 4) In life brilliant iridescent yellowish golden on pronotum and elytral discs and bases of expanded elytral margins (sometimes these parts are rich iridescent purplish or blackish brown); remainder of dorsal surfaces transparent and golden amber colored; dried specimens with pronotum, elytral discs and bases of expanded elytral margins amber

colored to pitchy red, head pitchy to black and ventral surfaces and appendages reddish testaceous. Head imbedded in prosternum, slightly deeper than wide, less than one-fifth as broad as prothorax; antennae slender, slightly thicker distally, reaching very little beyond outer edges of prothorax; prothorax nearly twice as broad as long, its anterior margin evenly rounded and surfaces smooth and glossy; scutellum triangular; elytra rounded, together with prothorax nearly forming a circle, disc of each swollen at humerus and on suture behind scutellum, forming a common tubercle, and also finely punctured in about nine incomplete longitudinal rows; explanate margins smooth; legs short; femora falling far short of reaching borders of expanded margins. Table III presents the range of measurements for the various life stages. First instar larva is represented by L_1, second instar by L_2, etc.

TABLE III

Measurements of various stages of *Aspidomorpha furcata* in millimeters

	Length of body excluding spines	Width of body including spines	Width of body excluding spines	Breadth of head-capsule
Egg	1.2 –1.35	.....	.58– .62	.....
Newly hatched larva	1.2 –1.4	1.0–1.2	.50– .60	.31– .42
Mature L_1 (first instar)	1.7 –2.0	1.4–1.7	.80– .88	
New L_2	1.7 –1.8	1.7–1.8	.80–1.0	.40– .52
Mature L_2	1.98–2.4	1.8–2.2	1.02–1.5	
New L_3	2.0 –2.4	2.1–2.4	.98–1.5	.54– .73
Mature L_3	2.4 –3.12	2.4–3.0	1.35–1.45	
New L_4	3.1 –3.3	3.0–3.2	1.8 –1.86	.74– .88
Mature L_4	4.0 –5.0	3.7–4.0	2.04–2.4	
New L_5	5.0 –5.4	4.8–5.3	1.5 –1.8	.87–1.4
Mature L_5	5.7 –6.5	5.8–6.2	3.6 –3.75	
Pupa	6.5 –6.6	5.5–6.5	5.0 –6.0	1.2 –1.4
Adult	6.6 –8.8	.....	5.5 –7.2	.9 –1.05

PARASITES AND PREDATORS

At least one chalcidoid parasite (plate 31, figure 8) of the larva, probably belonging to the Encyrtidae, has been reared, and possibly others also occur locally. A minute hymenopterous egg-parasite has also been found at Canton. The pupa and adult of this species each measures about 1.2 mm. in length, and the adult emerges by boring a hole through the ootheca to the outside.

Both of these species may attain a parasitism of as much as 15 per cent or more at times, and are therefore of some importance in keeping down the

numbers of the host. The adult beetles may occasionally be killed by parasitic fungi. The larvae, pupae, and adults are preyed upon by some of the smaller insectivorous birds such as tits, flycatchers, wagtails, and wren-warblers, and probably also by lizards.

Control: Handpicking of egg cases, larvae, pupae, and adults is tedious and time consuming, but may be the most practicable method for local farmers under existing conditions. It is important to pick extensively and thoroughly early in the spring before the population has increased with the first spring generations. Attention must not only be paid to sweet potato and swamp cabbage, however, for the populations may be maintained and increased on morning glory, and these plants must either be exterminated or the insects likewise controlled on them.

Chemical control should prove effective if carried out over a large enough area, and if the wild hosts be treated as well as the cultivated ones. Derris (rotenone) is effective for spraying, as are solutions of lead arsenate. Miller (1935) experimented successfully with Derris on *Aspidomorpha miliaris* in Malaya by using 75 grams of fresh root dried and added to 1,000 cc. of water. Derris may also be dusted on the plants. Lever (1934) suggested two pounds of lead arsenate to 50 gallons of water for *Aspidomorpha australasiae* var. *guerini* in the Solomon Islands. Hutson (1929) recommended super-arsenate of lead at rate of one pound to 50 gallons of water for *Aspidomorpha furcata* in Ceylon.

Biological Data on Other Chinese Species

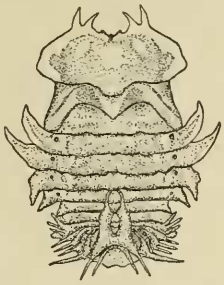
Basiprionota bimaculata (Thunberg)

(Text figure 1)

A number of larvae were reared on *Premna,* and one on *Liquidambar* at Suisapa, Lichuan, Hupeh Province, in July and August. The mature larva is about 8 mm. long, largely dark greenish with the pronotal disc and sides of the hind thorax darker; the lateral spines of the abdomen are pale; those of the thorax are dark, except that the first two are pale with darkened apices. The spines all bear very short spinules. The thoracic spines are of moderate length and subequal; the abdominal spines are stouter, the first three being about as long as the thoracic spines, the next three distinctly shorter and the last two by far the longest of all. The caudal furcae are stout, with slender, arched apices. The exuvial mass is compact, with the fecal mass above it extensive, consisting of crowded, arched filaments extending forward and often largely hiding the larva.

The pupa is yellowish with some darker markings on the back. It is broadest at middle. The pronotum is broadly expanded at sides and bears

two stout, tapering, curved spines at each corner of anterior emargination, and a short pair near middle of emargination. The lateral lobes of the second to fourth abdominal segments are large, flat, tapering and briefly tuberculate.



Text figure 1; *Basiprionota bimaculata*, pupa

The first two bend forward and the third backward. The fifth and sixth segments each bear a small posteriorly directed process. The pupal stage lasted five days.

Basiprionota chinensis (Fabricius)

Larvae, pupae and adults of this species were found together on the same plant at Behluhdin, Szechuan Province, on August 21, 1940. The host was a large-leaved herb about eight feet tall, but was not identified.

Craspedonta leayana insulana (Gressitt)

Numerous larvae, pupae and adults were found at Ta-hian, Hainan Island in June, 1935. The host was a small tree, probably *Gmelina,* the host of the typical form in Burma. The larva is stout, bearing long tapering cylindrical processes. The fecal mass consists of long irregular spreading filaments. The mature larva is blackish brown and the pupa is yellow with black markings. The pupa bears a pair of long tapering processes on each side of front of prothorax and similar ones on sides of abdominal segments.

Aspidomorpha sanctae-crucis (Fabricius)
(Plate 36, figure 3; pupa)

The larva has the four anterior prothoracic spines of each side long, the remainder of the lateral spines slightly shorter, except the last pair, and all with fairly long slender spinules. The fecal mass carried by the larva consists of long slender filaments, rather loosely arranged. The pupa has the pronotum even in anterior margin, with many minute marginal processes. The lateral processes of the abdominal segments are broad, flat and tapering and acute, with moderate spinules.

Laccoptera quadrimaculata (Thunberg)

(Plate 35; plate 36, figures 5 and 8)

This species feeds on the same host plants at Canton as does *Aspidomorpha furcata* (Thunberg), and is about equally common and destructive, if not more so. It is somewhat larger in bulk than the latter, being much more strongly convex and nearly as large in diameter. The ootheca consists of one to six or seven eggs laid horizontally in a compact mass embedded in translucent orange material and topped off with a small mass of black feces. The larva is orange at hatching and gradually becomes browner with the five successive instars. Its "parasol" consists of the exuviae fitted more closely together than in *A. furcata* and matted with a solid mass of feces which nearly hides the exuviae. The egg-laying record for a female was kept for the entire course of her life, from July 11 to October 3, 1942. She first mated on July 8. She laid a total of 972 eggs, an average of 11.6 eggs per day. The egg-laying record of another female was recorded from June 15 to August 17, 1942. She belonged to a mating pair collected in the field on May 29. The pair were observed mating again on June 8, and oviposition commenced on June 15. The female laid 768 eggs, an average of 12 per day. Of these eggs, 417 were laid in 218 oothecae, or an average of 1.9 eggs per ootheca. Both the male and female died on August 17, and eggs were laid up to and including that day. (See Hoffmann, 1933, and Kershaw & Muir, 1907.)

Cassida (Taiwania) circumdata Herbst

(Plate 28, figure 2; plate 36, figures 6 and 9)

This species is also very common on various species of *Ipomoea,* including sweet potato, at Canton, and is therefore likewise a pest. The eggs are laid singly in transparent capsules of a greenish or brownish color. The larvae and pupae are green. They resemble those of *Aspidomorpha furcata* in general form, but are easily distinguishable, as shown in the keys, below. The feces are not extruded on the exuviae in long strands, but are attached in small masses at the tips of the caudal furcae. The life history of this species has already been reported upon (Yeung, 1934). Plate 10, figure 9, illustrates a parasite of the larva.

Cassida (Taiwania) obtusata Boheman

(Plate 34)

This species is common at Canton, and is brilliant golden in the adult stage. It feeds in the larval and adult stages on cockscomb *(Celosia argentea* Linn.) and on *C. cristata, Amaranthus tricolor, A. paniculatus, Alternanthera sessilis,* and *Spinacia oleracea* at Canton. The adults are also minor pests of various species of *Citrus, (C. maxima, C. limonia, C. nobilis, C.*

sinensis) particularly orange and pomelo, and also *Fortunella margarita,* feeding on the young leaves in various seasons, but particularly in the winter and early spring. The larvae, however, could not be induced to feed on even very tender *Citrus* leaves. Table IV shows the lengths in days of the various stages of several individuals reared in the spring and early summer. Table V shows the dates and lengths of the generations of descendants of female no. G41–317, from August, 1941, to July, 1942. Five, however, is not necessarily the maximum number of generations per year, as the earliest eggs were not reared in every case. Since the life cycle occupies less than one month during the warm three-quarters of the year, as many as ten or twelve generations are possible.

One female, mated in September, laid 1,192 eggs in 11 weeks, or an average of nearly 16 eggs per day.

The molting of a larva of *C. obtusata* from the first to the second instar was observed on April 15, 1942. The molting process took place between 10:35 and 10:50 a. m. During the first 12 minutes the body contracted and expanded through muscular action and pressure of the body fluid in various parts. During this period the contractions and expansions increased in severity till the cuticle split along the mid-dorsal line, starting anteriorly, with the concentration of the body fluids there, and consequent swelling. The actual emergence occupied but three minutes. The larva was held to the leaf surface by the tarsal claws of the old cuticle until the new instar emerged and began using its legs. The final extrication from the exuviae was completed suddenly by the anterior portion of the body, the six legs all appearing at once. The exuvial legs remained attached until the abdomen was free except for its apex. Then as the larva placed its legs on the leaf surface the exuviae were snapped into the air and attached to the new caudal furca. The moulting was then complete and the exuviae shrank to their normal position in the "parasol" with the exuvial spines projecting.

TABLE IV

Length of immature stages of *Cassida obtusata* in days

No.	Date eggs laid	Length of egg stage	Larval stadia					Prepupa	Pupa	Egg to Adult	Adult	
			L_1	L_2	L_3	L_4	L_5				♂	♀
G42–2a	Apr. 4	3+	3.7	1.8	1.75	1.	5.	1.5	5.0	23.		
" d	"	5—	1.7	1.3	1.75	3.5	5.	1.5	5.0	24.7		
" g	"	5—	1.7	1.2	1.	4.	5.	1.5	5.0	24.5		
G42–6a	May 23	3	2.—	1.—	.6	.7	4.	2.	3.+	16.2		
" b	"	3	2.+	.7	.8	2.0	4.		3.0	15.5	30	
" d	"	3+	2.	.7	1.0	1.5	3.		3.—	14.2		54
" e	"	3+	2.	.7	.8	2.	3.		3.0	14.5	71	
" f	"	3+	1.7	.7	1.5	1.5	4.		3.0	15.5		76
G42–9a	June 22	3+	1.5	1.5	1.6	2.	4.2		3.8	17.7	63	
" b	"	3+	1.5	1.2	1.3	1.5	3.		3.5	15.1		

TABLE V

Generations of *Cassida obtusata* in one year

	Total days (egg to egg)
1. August 2–October 7, 1941	66
2. October 7–April 17, 1942	194
3. April 17–May 23, 1942	36
4. May 23–June 22, 1942	30
5. June 22–July 22, 1942	30

The feces are attached to the exuviae in a rather rough mass, largely obscuring them.

Cassida (s. str.) **japana** Baly

(Plate 33)

This species was reared on *Alternanthera sessilis* R. Br. at Canton. The eggs are laid individually in oblong, transversely striated, greenish oothecae. The larvae are not very different from those of *C. circumdata*, but are more slender, of a paler green, and have the spiracles much more prominent. They differ from those of *C. obtusata* in somewhat the same respects, those of the latter being much paler and shorter. The exuviae are more recognizable in the parasol than is the case in *C. obtusata*.

The life history occupies a very slightly longer period than is the case with *C. obtusata*.

The egg-laying record for the complete life of a female *C. japana* (No. G42–85) was as follows: The beetle emerged from the pupa on April 13, 1942, and was first observed to mate on April 25, when she was segregated with her mate. Egg-laying commenced on April 26 and continued to August 25, the female dying on August 28. Thus the egg-laying period lasted for 121 days. A total of 953 eggs were laid, representing an average of 7⅝ eggs per day. The maximum number of eggs laid in one day was 40, on May 29. During the first two weeks 139 eggs were laid, or an average of nearly 10 per day. During the first two weeks of June the average was 22 per day. Another female laid 777 eggs in ten weeks, or an average of 11 eggs per day.

In June the various stages lasted as follows: egg, 6 days; first instar larva, 2 days; second instar, 2 days; third instar, 2 days; fourth instar, 2 days; fifth instar, 5 days; pupa, 4 days; adult female 175 days (emerged in July). Another adult female lived for 105 days (emerged in October). In February the lengths of the stages were: egg, 13 days; first instar, 4 days; second instar, 5 days; third instar, 4 days; fourth instar, 5 days; fifth instar, 15 days; pupa, 11 days; adult female, 101 days.

Key to the Known Oothecae of Chinese Cassidinae

1. Oothecae composed of several or many thin, oblong, papery layers fastened at one end; the eggs hidden between them. *(Aspidomorpha)* 2

— Oothecae not composed of many thin papery layers fastened at one end 4

2.(1) Oothecae of thin papery layers projecting at sides throughout 3

— Oothecae with papery layers of egg-containing portion folded at sides to form air cells; each ootheca containing 32–80 eggs in 4 rows with 2 rows of air cells on each side of egg cells ..... *Aspidomorpha miliaris*

3.(2) Oothecae rather flat, generally containing 2–9 eggs ..... *Aspidomorpha furcata*

— Oothecae rather thick, generally containing a few dozen eggs each ..... *Aspidomorpha sanctae-crucis*

4.(1) Eggs laid singly or in small groups, generally with a thin covering layer or envelope, and often covered with feces in addition 5

— Eggs laid in a large dense group in a single layer, surrounded by a frothy mass which hardens to form a protective ootheca ..... *Craspedonta leayana*

5.(4) Eggs laid in small, rather evenly bordered capsules between 2 simple membranes without feces, or in groups covered with fecal masses 6

— Eggs laid singly between 2 irregular layers of semi-transparent material covered with an irregular opaque layer with bars or undulations, which in turn is generally partly covered with bits of feces ..... *Basiprionota*

6.(5) Eggs laid in small, sometimes individual, more or less transparent envelopes, generally without a thick covering of feces 7

— Eggs laid in small groups, often 1 or 2 on top of 2–4 in a transparent orange jelly-like material and more or less covered with a thick mass of feces ..... *Laccoptera quadrimaculata*

7.(6) Eggs not fringed with spicules 8

— Eggs fringed with small spicules, laid singly and covered with a translucent membrane ..... *Sindia*

8.(7) Ootheca covered, or partly covered, by feces; 3–15 eggs, in 3 layers, per ootheca 9

— Ootheca without any fecal covering; 1–2 eggs per ootheca 10

9.(8) Egg with chorion reticulate and micropyle not easily recognizable ..... *Cassida* (s. str.) *nebulosa*

— Egg with chorion not reticulate; micropyle distinct, consisting of a small plate with radiating impressions ..... *Cassida (Odontionycha) viridis*

10.(8) Eggs laid between 2 semi-transparent brownish membranes of oval or oblong outline, with corrugations transverse or lacking 11

— Eggs laid singly in a subtransparent green, or less often brownish, capsule shaped like the vane of an arrow, with oblique corrugations from the bicarinate median ridge ..... *Cassida (Taiwania) circumdata*

11.(10) Ootheca oblong, with transverse corrugations; containing a single egg ..... *Cassida* (s. str.) *japana*

— Ootheca irregularly oval, lacking corrugations; generally 2 eggs per ootheca ..... *Cassida (Taiwania) obtusata*

KEY TO THE KNOWN MATURE LARVAE OF CHINESE CASSIDINAE

1. Second lateral process of mesothorax and anterior lateral process of metathorax shorter than posterior processes of same segments, or lacking.... 2

— Second lateral process of mesothorax and anterior lateral process of metathorax of more or less equal length; 16 pairs of lateral processes exclusive of caudal furcae 6

2.(1) Second lateral process of mesothorax and anterior lateral process of metathorax lacking or minute; 14 pairs of lateral processes excluding caudal furcae; feces arranged in long stringy filaments..... 3

— Second lateral process of mesothorax and anterior lateral process of metathorax somewhat shorter than posterior processes of same segments; 16 pairs of lateral processes 4

3.(2) Anterior 2 pairs of processes of pronotum fully as long as lateral processes, nearly as long as last 2 abdominal pairs; dorsal surfaces dull and evenly pigmented except on sides of pronotum, which are pale..... *Craspedonta leayana insulana*

— Anterior 2 pairs of processes of pronotum shorter and stouter than most of lateral processes, much shorter than last 2 abdominal pairs; dorsum with many dark spots on paler ground color..... *Epistictia*

4.(2) Lateral processes more or less stout, with granule-like spinules; feces attached to sides of exuviae in long curved filaments in concentric arcs.... 5

— Lateral processes long, slender and rigid, with slender spinules; feces not in long curved filaments..... *Hypocassida subferruginea**

5.(4) Lateral processes not very stout..... *Basiprionota bimaculata*

— Lateral processes thick, short and fleshy.... *Basiprionota maculipennis reducta*

6.(1) Lateral processes generally longer than ¼ width of body, or caudal furcae at most hardly more than twice as long as last pair of lateral processes; length of mature larva generally over 7 mm..... 7

— Lateral processes generally shorter than ¼ width of body, or caudal furcae much more than twice as long as last pair of lateral processes; length of mature larvae generally under 7 mm..... 13

7.(6) First 2 processes on each side of prothorax distinctly joined at bases, bearing stout spinules; caudal furcae fully twice as long as last pair of lateral processes 8

— First 2 processes on each side of prothorax not very distinctly joined at bases, bearing slender spinules; caudal furcae not twice as long as last pair of lateral processes..... 9

8.(7) "Parasol" forming a triangle which is somewhat longer than broad.... *Sindia*

— "Parasol" forming a triangle which is broader than long..... *Laccoptera quadrimaculata*

9.(7) Feces generally not of extremely long slender filaments, or not retained long on exuviae 10

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* This genus and species have not been recorded from China, but may occur in northern Sinkiang or Mongolia, since it has a widespread Palearctic distribution.

— Feces of very long slender filaments which are fairly persistent; fifteenth and sixteenth lateral processes much longer than fourteenth..... *Aspidomorpha sanctae-crucis*

10.(9) Caudal furcae much longer than last pair of lateral processes..... 11

— Caudal furcae not longer, or barely longer, than lateral processes..... 12

11.(10) Caudal furcae irregularly sinuate; spinules mostly longer than subbasal diameters of lateral processes; dark pigment only on sides of pronotum and bases of caudal furcae..... *Aspidomorpha chandrika*

— Caudal furcae regularly sinuate; spinules mostly shorter than subbasal diameters of lateral processes; bases of lateral processes and 2 spots on each side of each abdominal tergite black..... *Aspidomorpha dorsata*

12.(10) Lateral processes pale, enlarged at extreme bases; spinules abundant on distal portions of processes; dorsum pale green except for sides of pronotum..... *Aspidomorpha furcata*

— Lateral processes black, not enlarged basally; spinules few and short on distal portions of processes; dorsum creamy marked with pairs or transverse rows of black spots..... *Aspidomorpha miliaris*

13.(6) Caudal furcae more than twice as long as fifteenth lateral process..... 14

— Caudal furcae not more than twice as long as fifteenth lateral process..... 15

14.(13) Caudal furcae 2 or 3 times as long as fifteenth or sixteenth lateral processes; length of spinules not as great as subbasal diameters of processes in all cases; generally feeds on Labiatae..... *Cassida (Odontionycha) viridis*

— Caudal furcae about 4 times as long as fifteenth or sixteenth lateral processes; length of spinules greater than subbasal diameters of lateral processes in most cases; generally feeds on Chenopodiaceae..... *Cassida* (s. str.) *nebulosa*

15.(13) Feces rather densely matted on exuviae; fifteenth and sixteenth lateral processes fairly equal in length, or body length under 5 mm..... 16

— Feces sparse or limited to caudal furca of first instar exuviae; fifteenth and sixteenth lateral processes unequal in length, or spinules perpendicular to lateral processes..... 17

16.(15) Exuviae hidden by feces, making determination of instar difficult; length of body less than 5 mm.; generally feeds on Amaranthaceae as larva and on *Citrus* as adult..... *Cassida (Taiwania) obtusata*

— Exuviae not hidden by feces, visible from above in resting position; length about 8–9 mm.; generally feeds on Compositae..... *Cassida* (s. str.) *rubiginosa*

17.(15) Fifteenth lateral process more than twice as long as fourteenth; fifteenth and sixteenth lateral processes of each set of exuviae prominently projecting at sides; caudal furcae of first instar exuviae long, widely divergent and bearing a solid feces mass; feeds on Convolvulaceae..... *Cassida (Taiwania) circumdata*

— Fifteenth lateral process not much longer than fourteenth; fifteenth and sixteenth lateral processes of each set of exuviae not prominently projecting; caudal furcae of first instar exuviae not long and widely divergent; feeds on Compositae, Chenopodiaceae, and Amaranthaceae..... *Cassida* (s. str.) *japana*

KEY TO THE KNOWN PUPAE OF CHINESE CASSIDINAE

1. Pronotum at least slightly emarginate apically in middle, or with a few long projecting processes 2

— Pronotum not emarginate apically, or only very narrowly emarginate at middle of anterior border and fringed with many small processes..... 4

2.(1) Pronotum feebly emarginate apically, with 2 forward projecting processes on each side of anterior border..... 3

— Pronotum tuberculate on disc, distinctly emarginate apically, with 2 short, stout, incurved processes on each side of emargination; abdomen with stout fleshy lateral processes on second to fourth segments..... *Basiprionota bimaculata*

3.(2) Abdomen with a long, curved process on each side of first 5 segments; dorsum marked with large areas of dark and pale..... *Craspedonta leayana insulana*

— Abdomen with a stout triangular process on each side of first 5 segments; dorsum marked with transverse or arcuate bands of black spots..... *Epistictia*

4.(1) Anterior margin of pronotum with many small, slender processes..... 5

— Anterior margin of pronotum with only 2 processes on each side of middle; lateral expansions of abdominal segments with very short spinules; dorsum marked with a pair of oblong black spots on each of the first 2 abdominal segments ..... *Aspidomorpha miliaris*

5.(4) Abdomen with third and fourth spiracles not 3 times as high as first and second 6

— Abdomen with third and fourth spiracles 3 times as high as first and second; lateral expansions of intermediate abdominal segments parallel-sided basally, with 4–6 spinules on each side of each..... *Cassida* (s. str.) *nebulosa*

6.(5) More than 5 spinules on posterior margin of each lateral abdominal process 7

— Generally only 2–4 spinules on posterior margin of each lateral abdominal process 10

7.(6) Lateral abdominal processes gradually narrowed, slender and acuminate distally; prothorax nearly twice as broad as long..... 8

— Lateral abdominal processes suddenly narrowed distally; prothorax much less than twice as broad as long, bordered by about 75 spinules of appreciable length ..... *Laccoptera quadrimaculata*

8.(7) Pronotum entirely pale; lateral abdominal processes entirely or largely pale; spinules of pronotal margin of appreciable length..... 9

— Pronotum black along base and on median portion almost to anterior margin; spinules of pronotal margin extremely short; first pair of lateral abdominal processes dark; length 15 mm..... *Aspidomorpha sanctae-crucis*

9.(8) Abdominal terga largely dark brown; lateral abdominal processes bordered anteriorly with brown, and with minute spinules; length 11 mm..... *Aspidomorpha dorsata*

— Abdominal terga brown along a lateral strip passing over spiracles; lateral

abdominal processes entirely pale, with spinules fully one-half as long as those of pronotal margin; length 6–7 mm.....*Aspidomorpha furcata*

10.(6) Anterior margin of pronotum lacking 1 or 2 pairs of spinules which are much thicker than others near middle of margin..... 11

— Anterior margin of pronotum with 1 or 2 pairs of spinules which are much thicker than others near middle of margin..... 12

11.(10) Sides of pronotum angulate near middle; anterior margin narrowly emarginate at middle.....*Cassida* (s. str.) *rubiginosa*

— Sides of pronotum evenly rounded; anterior margin not emarginate.....*Cassida (Taiwania) circumdata*

12.(10) Posterolateral corners of prothorax rounded, or at least not produced..... 13

— Posterolateral corners of prothorax angulate and produced posteriorly; lateral expansions of third to fifth abdominal segments very short.....*Cassida (Odontionycha) viridis*

13.(12) Anterior spiracles of abdomen several times as high as wide; color grass green; length 4.75 mm.....*Cassida* (s. str.) *japana*

— Anterior spiracles of abdominal segments not several times as high as wide; color yellowish green to yellow; length 4 mm.....*Cassida (Taiwania) obtusata*

Host-plant Relationships†

A study of the host-plant relationships of the Cassidinae of the world has been made as an aid in drawing conclusions as to the derivation and evolution of the Chinese fauna in this group. All available and reliable sources in the literature have been taken into account, though only specific larval food plants are considered. Collection records of adult beetles are by no means reliable indications of larval food plants, or even of adult food plants unless it be recorded that the adults were actually observed to be feeding on the particular plant.

Following is a list of plant families fed upon by tortoise beetles, with each plant family followed by the names of the genera of beetles which definitely feed upon its members in the larval stage. Fifty genera of tortoise beetles are involved, and in addition, six subgenera of the genus *Cassida*. Both plant families and beetle genera are arranged phylogenetically. Members of the genera asterisked attack more than one plant family.

Palmaceae: Platyauchenia, Hemisphaerota, Delocrania, Spaethiella.

Urticaceae: *Cassida (*Cassidulella).

Chenopodiaceae: Oxylepis, Ischyronota, *Cassida (*Cassida, *Mionycha, *Cassidulella).

Amaranthaceae: *Cassida (*Cassida, *Taiwania).

Caryophyllaceae: *Cassida (*Odontionycha, *Cassida, *Mionycha, *Cassidulella).

† This section was not revised after the manuscript was originally submitted in 1945.

Rosaceae: *Cassida (*Cassida, *Taiwania).

Euphorbiaceae: *Aspidomorpha (needs verification).

Sterculiaceae: Spaethiella, *Omaspides.

Asclepidaceae: *Chelymorpha, *Cassida (*Cassida).

Convolvulaceae: *Craspedonta, *Pseudomesomphalia, Neomphalia, *Poecilaspis, Selenis, Echoma, *Omaspides, *Chelymorpha, *Aspidomorpha, Sindia, Laccoptera, Agroiconota, Philaspis, Deloyala, *Coptocycla, Strongylaspis, *Plagiometriona, *Metriona, Cteisella, Ctenochira, Jonthonota, Oocassida, *Thlaspida, Hypocassida, *Cassida (*Cassida, *Taiwania).

Boraginaceae: Oma, Desmonota, *Polychalca, *Poecilaspis, Eurypepla, *Physonota, Cistudinella, Ischyrosonyx, *Coptocycla, Psalidonota, *Charidotis.

Solanaceae: Conchyloctenia, Gratiana, Orectis, *Plagiometriona, *Metriona.

Verbenaceae: *Craspedonta, Basiprionota, *Aspidomorpha, *Thlaspida.

Labiatae: Nebroma, *Polychalca, *Cassida (*Odontionycha, Lordiconia, *Cassida, *Mionycha).

Scrophulariaceae: *Physonota, *Cassida (*Cassida).

Bignoniaceae: Dorynota, Syngambria, *Charidotis.

Rubiaceae: *Charidotis.

Cucurbitaceae: *Pseudomesomphalia.

Compositae: *Pseudomesomphalia, Nebraspis, *Physonota, Basipta, Pilemostoma, *Cassida (*Odontionycha, *Cassida, *Mionycha, *Cassidulella).

In the following list the host-plant families and genera are listed for each zoogeographical region. The numbers of tortoise-beetle genera and species attacking each follow in parentheses, except for families attacked in more than one region, which are asterisked. In this list beetle subgenera are counted as genera. One hundred and fifty-eight species of the fifty-five genera or subgenera are involved. The plant families are arranged approximately in systematic order, principally following the Engler-Prantl system.

Palearctic Region

Urticales: Urticaceae (1 genus: 2 species of beetles)—Urtica (1:2).

Centrospermae: Chenopodiaceae (4:6)—Beta (2:4), Chenopodium (2:3), Atriplex (3:4), Salicornia (2:3), Salsola (2:2). Caryophyllaceae (4:8)—Stellaria (2:2), Arenaria (2:3), Spergula (3:5), Lychnis (1:1), Saponaria (1:3), Silene (4:5), Dianthus (2:3).

Rosales: Rosaceae (1:1)—Pyrus (1:1), Prunus (1:1), Sorbus (1:1).

Gentianales: *Asclepidaceae—Cynanchum (1:1).

Polemoniales: *Convolvulaceae—Convolvulus (2:3), Calystegia (1:1) (the beetle species belongs to an Oriental genus).

Lamiales: *Verbenaceae—Callicarpa (1:1) (beetle genus is Oriental). *Labiatae—Nepeta (1:1), Salvia (3:4), Stachys (1:1), Lycopus (2:2), Mentha (2:2), Thymus (1:1), Melissa (1:1), Galeopsis (1:1).

Scrophulariales: *Scrophulariaceae—Verbascum (1:1).

Asterales: *Compositae—Cichorium (1:1), Scorzonera (1:3), Sonchus (1:2), Hieracium (1:1), Inula (3:3), Filago (1:1), Helichrysum (1:1), Antennaria (1:1), Anthemis (2:3), Achillea (2:9), Tanacetum (1:7), Matricaria (1:1), Artemisia (1:2), Senecio (1:1), Silybum (1:1), Cynara (1:1), Cirsium (2:6), Carduus (1:3), Centaurea (2:3), Serratula (1:1), Onopordon (1:2), Lappa (1:2), Fulicaria (1:3), Gnaphalium (2:2).

Nearctic Region

Princeps: *Palmaceae—Sabal (1 genus: 1 species of beetles).

Gentianales: *Asclepidaceae—Asclepias (1:1).

Polemoniales: *Convolvulaceae—Convolvulus (8:10), Ipomoea (4:7). *Boraginaceae—Cordia (2:2). *Solanaceae—Solanum (4:4), Lycopersicum (1:1), Capsicum (1:1), Physalis (3:3).

Scrophulariales: *Scrophulariaceae—Monarda (1:1).

Asterales: *Compositae—Helianthus (1:1), Silphium (1:1).

Neotropical Region

Princeps: *Palmaceae—Cocos (3 genera: 4 species of beetles).

Malvales: Sterculiaceae (2:2)—Theobroma (2:2).

Polemoniales: *Convolvulaceae — Ipomoea (12:25). *Boraginaceae—Cordia (7:9), Patagonula (3:3). *Solanaceae—Solanum (2:3), Acnistus (1:1), Physalis (1:1), Bassowia (1:1).

Lamiales: *Labiatae—Hyptis (2:2).

Scrophulariales: Bignoniaceae (3:10) — Tecoma (2:5), Pyrostegia (1:2), Bignonia (1:1), Pithecoctenium (1:1), Arrabidaea (1:1).

Rubiales: Rubiaceae (1:1)—Anisomeris (1:1).

Cucurbitales: Cucurbitaceae (1:1)—Cucurbita (1:1).

Asterales: *Compositae—Eupatorium (1:1), Baccharis (1:1), Mikania (2:3).

Ethiopian Region

Polemoniales: *Convolvulaceae — Ipomoea (2 genera: 4 species of beetles). *Solanaceae—Solanum (2:2).

Asterales: *Compositae—Brachylaena (2:2).

Oriental Region

Centrospermae: Amaranthaceae (1 genus: 3 species of beetles)—Celosia (1:1), Amaranthus (1:2), Alternanthera (1:1).

Polemoniales: *Convolvulaceae—Convolvulus (1:1), Ipomoea (8:16), Calonyction (1:1), Rivea (1:1).

Lamiales: *Verbenaceae—Callicarpa (1:1), Gmelina (2:2), Premna (1:3), Tectona (1:1).

Following are the total numbers of genera and species of tortoise beetles attacking members of the 14 plant families mentioned above, for the world: Palmaceae (3 genera: 5 species of beetles), Urticaceae (1:2), Chenopodiaceae (4:6), Amaranthaceae (1:3), Caryophyllaceae (4:8), Rosaceae (1:1), Sterculiaceae (2:2), Asclepidaceae (2:2), Convolvulaceae (22:58), Boraginaceae (9:12), Solanaceae (6:11), Verbenaceae (4:7), Labiatae (6:8), Scrophulariaceae (2:2), Bignoniaceae (3:10), Rubiaceae (1:1), Cucurbitaceae (1:1), Compositae (9:28).

The above host records may be analyzed geographically as follows: In the Palearctic region hosts are known for 7 of the 12 genera of tortoise beetles, or 58 per cent (11 of the 18 genera and subgenera), and for 42 of the 102 species, or 42 per cent. In the Nearctic region hosts are known for 12 of the 15 genera, or 80 per cent, and for 18 of the 31 species, or 58 per cent. In the Neotropical region hosts are known for 29 of the 109 genera, or 27 per cent, and for 63 of the 1,663 species, or 4 per cent. In the Ethiopian region hosts are known for 4 of the 35 genera, or 12 per cent, and for 8 of the 649 species, or 1 per cent. In the Oriental region, hosts are known for 9 of the 27 genera, or 33 per cent, and for 27 of the 445 species, or 6 per cent.

The Cassidinae may be said to be rather limited in the range of their host-plant preferences, both in the sense of the subfamily as a whole, and as individual species. In Europe, where the beetles are best known, several species feed upon five or more genera of plants, though in such a case the plant genera usually are limited to one or two families.

Fourteen genera of tortoise beetles are recorded to attack members of more than one plant family each. Their names follow with the number of plant families listed in parentheses following each: Craspedonta (2), Polychalca (2), Pseudomesomphalia (3), Poecilaspis (2), Omaspides (2), Chelymorpha (2), Physonota (3), Aspidomorpha (3), Coptocycla (2), Plagiometriona (2), Metriona (2), Charidotis (3), Thlaspida (2), Cassida (10) [subgenera: Odontionycha (3), Cassida (9), Mionycha (4), Cassidulella (4), Taiwania (3)].

The largest number of plant families attacked by members of a single genus is ten. The genus, *Cassida,* is the best known of all as to its host rela-

tionships, and extensive records of nearly fifty species of the genus are represented among the ten host plant families. However, being an old and generalized genus, it very likely has the broadest host-preference range. For the entire world, the average number of host genera per beetle species is slightly under two, for those of known hosts, though for Europe it is close to three. The species with the largest number of host plant genera, *Cassida (Mionycha) margaritacea* Schaller, of Europe, feeds upon *Atriplex, Spergula, Saponaria, Silene, Dianthus, Thymus, Antennaria, Centaurea, Helichrysum, Gnaphalium,* and, perhaps questionably, *Clematis.* Thus it feeds upon members of four plant families, for certain. Next to this species two European species of the subgenus *Cassidulella* feed on eight or nine plant genera each. Forty-two European species feed on 52 plant genera. One hundred and fifty-eight world species attack 90 plant genera.

Perhaps the most striking fact to be gleaned from the above data is the great concentration on two plant families, the Convolvulaceae, attacked by 25 genera (and 2 subgenera of *Cassida),* and the Compositae, attacked by six genera (and 4 subgenera of *Cassida).* Furthermore, the European species *(Cassida)* largely attack the Chenopodiaceae, Caryophyllaceae, Labiatae, and Compositae, while the majority of the tropical species, both Paleotropical, and Neotropical, attack the Convolvulaceae. Plants belonging to the latter family are fed upon by 40 per cent of the beetles of known host relationship. The Compositae are attacked by 18 per cent, and the Bignoniaceae by 8 per cent, the latter being all Neotropical.

Analyzing the plant hosts, it will be seen that only 18 out of the 200 most important higher plant families are attacked, and only one of the families is monocotyledonous, all being angiosperms. Furthermore, only ten out of 45 major divisions of the Angiospermae are concerned. Sixty-seven per cent of the tortoise-beetle species attack members of the group Tubiflorae, and 18 per cent those of the Campanulariae. Nine per cent attack members of the Centrospermae and 10 per cent attack the other seven groups, there being a 4 per cent overlapping in plant group preference. Further, analyzing geographically, the Palearctic beetles nearly all attack the Campanulariae and Centrospermae, the Oriental and Nearctic species largely attack the Tubiflorae, and the Neotropical and Ethiopian species largely attack the Tubiflorae and Campanulariae.

As far as the phylogeny of the plant hosts is concerned, it may be seen that the most primitive tortoise beetles attack the most primitive plants and the most advanced forms concentrate on the most advanced plants, though having a wider host preference range. Furthermore, the sympetalous plants (above the Sterculiaceae), which are so particularly attacked, are, according to one theory (Bessey, 1915), supposed to have been derived from the par-

ticular groups of choripetalous plants which serve as the hosts of the remainder of the subfamily, exclusive of those feeding on Palmaceae.

These facts, correlated with the history of these plant groups, as it becomes better known, may serve as an aid in the study of the phylogeny of the Cassidinae. From the data accumulated, it is obvious that the tortoise beetles have, in the main, relatively narrow host preferences, and have probably not changed them much during their course of evolution, since the same genera of plants are concentrated upon in the Paleo- and Neotropical parts of the world, and species occurring both in Europe and Japan feed upon approximately the same plants. Thus the evolution of the Cassidinae is at least to some extent associated with the evolution of the higher sympetalous plants.

ZOOGEOGRAPHY†

The Cassidinae lend themselves well to a study of distribution of life, since they are rarely transported from one area to another by man, other forms of life, or the elements. Thus their present world distribution, excepting one or two European species introduced into North America, may be considered to be a result of the combined effects of their own evolution, the evolution and dissemination of their plant hosts, and the movements in the earth's crust since late Paleozoic time.

The most striking facts of the world distribution of the tortoise beetles at the present time are that the group is dominantly Neotropical, having over one-half its known species in that region, and that it is practically lacking from the Nearctic and Australian (Oceanic) regions. In table VI the major zoogeographical regions or subregions of the world are listed with the numbers of genera and species of Cassidinae known from each. The extent of generic and specific endemism is also indicated for each. Thus it is seen that no species, or even genera, are possessed in common by the Old and New Worlds, that no species occur on the Pacific islands north and east of the Solomons and New Caledonia, and that very few species overlap the regions or subregions listed. It may further be added that the Nearctic species, or those so listed, are actually largely confined to the southern areas of North America which are considered to be essentially Neotropical in the origin of their faunae. This is even more significant since it appears that no fossil Cassidinae are known from North America, where most beetle groups of Holarctic distribution are fairly well represented as fossils. Furthermore, the Neotropical species are dominantly tropical, and the Australian species are almost entirely in the northern, tropical part of the continent, where the fauna is more Indo-Australian. Thus the subfamily is a tropical group at present, with, however, a considerable development in the Palearctic region.

† This section was not revised after the manuscript was originally submitted in 1945.

TABLE VI

Genera and species of Cassidinae by Zoogeographical Regions

Region	No. of genera	No. endemic genera	% genera endemic	No. of species	% species endemic
Neotropical	107	96	91	1,663	99
Nearctic	15	2	13	31*	61
Palearctic	12	8	67	102	93
Ethiopian	34	28	82	645	100
Africa	30	24	80	443	100
Madagascar	11	4	36	202	100
Oriental	27	15	55	445	98
Australasian	11	5	45	73	97
Indo-Australian**	8	2	25	44	93
Australia	6	3	50	28	100
Pacific Is.***	0	—	—	0	—
New World	109	109	100	1,682	100*
Old World	48	48	100	1,354	100

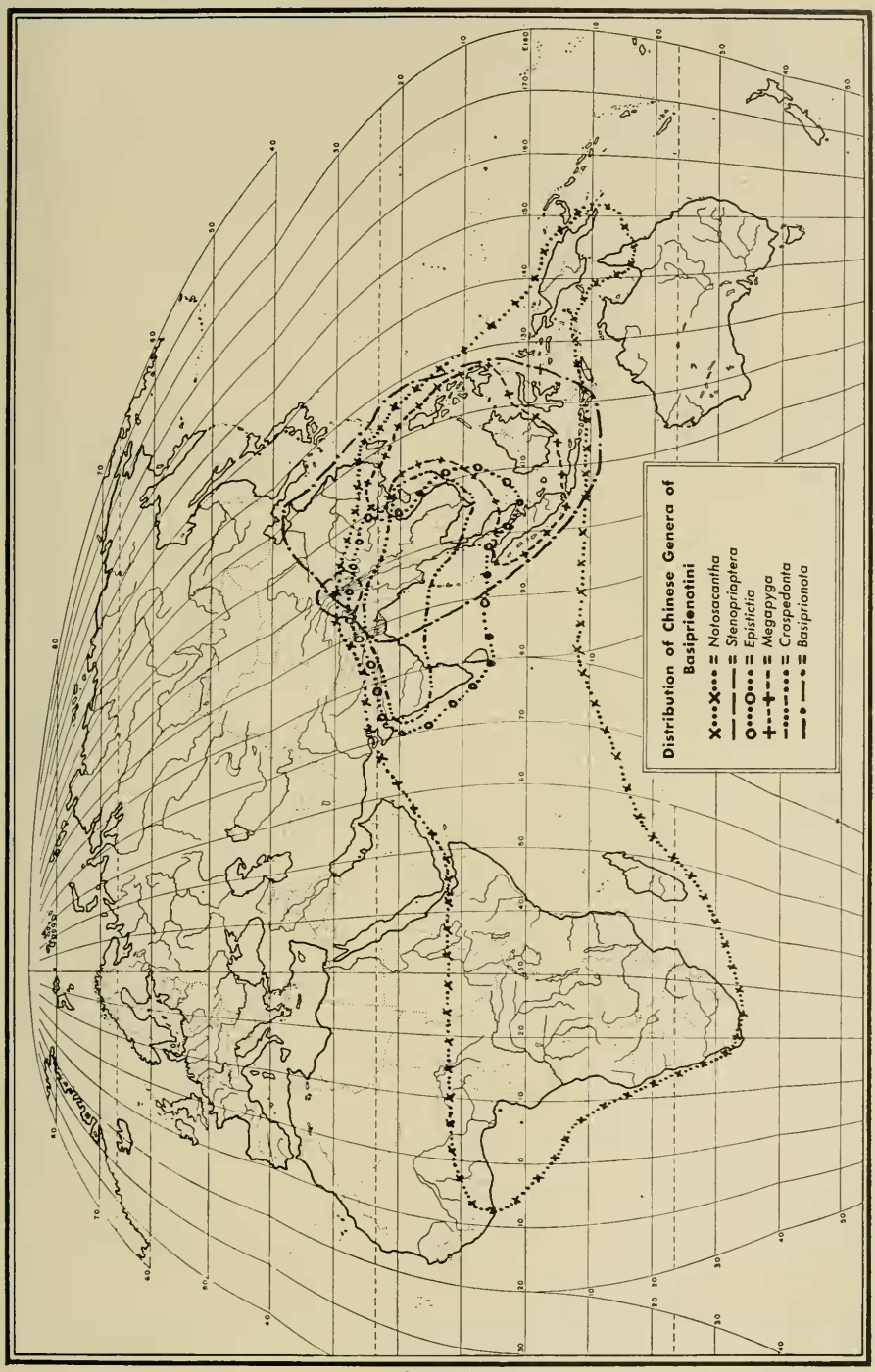
* European species introduced into North America are not taken into account.

** For the purposes of this study, the Indo-Australian Subregion is interpreted as including the Moluccas, the Lesser Sunda Islands, New Guinea, the Solomon Islands and New Caledonia, and excluding the Philippine Islands.

*** Under this category are included Tasmania, New Zealand, and the Pacific Islands north and east of the Solomons and New Caledonia.

To further evaluate the significance of this striking world distribution, a comparison has been made, in table VII, of the world distribution of each of the 16 subfamilies of Chrysomelidae. From this table it will be seen that the three most primitive subfamilies, Orsodacninae, Sagrinae, and Donaciinae, are the only ones which are not unquestionably dominantly tropical. Furthermore, Sagrinae is the only dominantly Australian group, and the other two are the only ones, aside from the small subfamily Lamprosominae, which by any means approach their ratio of 50 per cent or more of their genera Holarctic or cosmopolitan in distribution. Also all three of these groups are at present dominantly Old World in constituency. Thus the case of these three is diametrically opposed to the situation in the Cassidinae, where the group is dominantly tropical, dominantly New World, almost lacking in the Nearctic region, without any genera common to the Old and New Worlds, and thus apparently lacking in any evidence of holarctic distribution. The situation in the subfamilies other than those discussed above is more similar to the situation in the Cassidinae, although only the Hispinae, their closest relatives, have such a striking division between the Old and New World faunae except the Megascelinae, which are entirely Neotropical, and the Megalopodinae, which are like the previous named, relatively small.

It may also be seen that the characteristic of being dominantly New World, as far as numbers of genera is concerned, is less often the case than


Distribution of Chinese Genera of Basiprionotini
Notosacantha
Stenopriaptera
Epistictia
Megapyga
Craspedonta
Basiprionota

Map 1

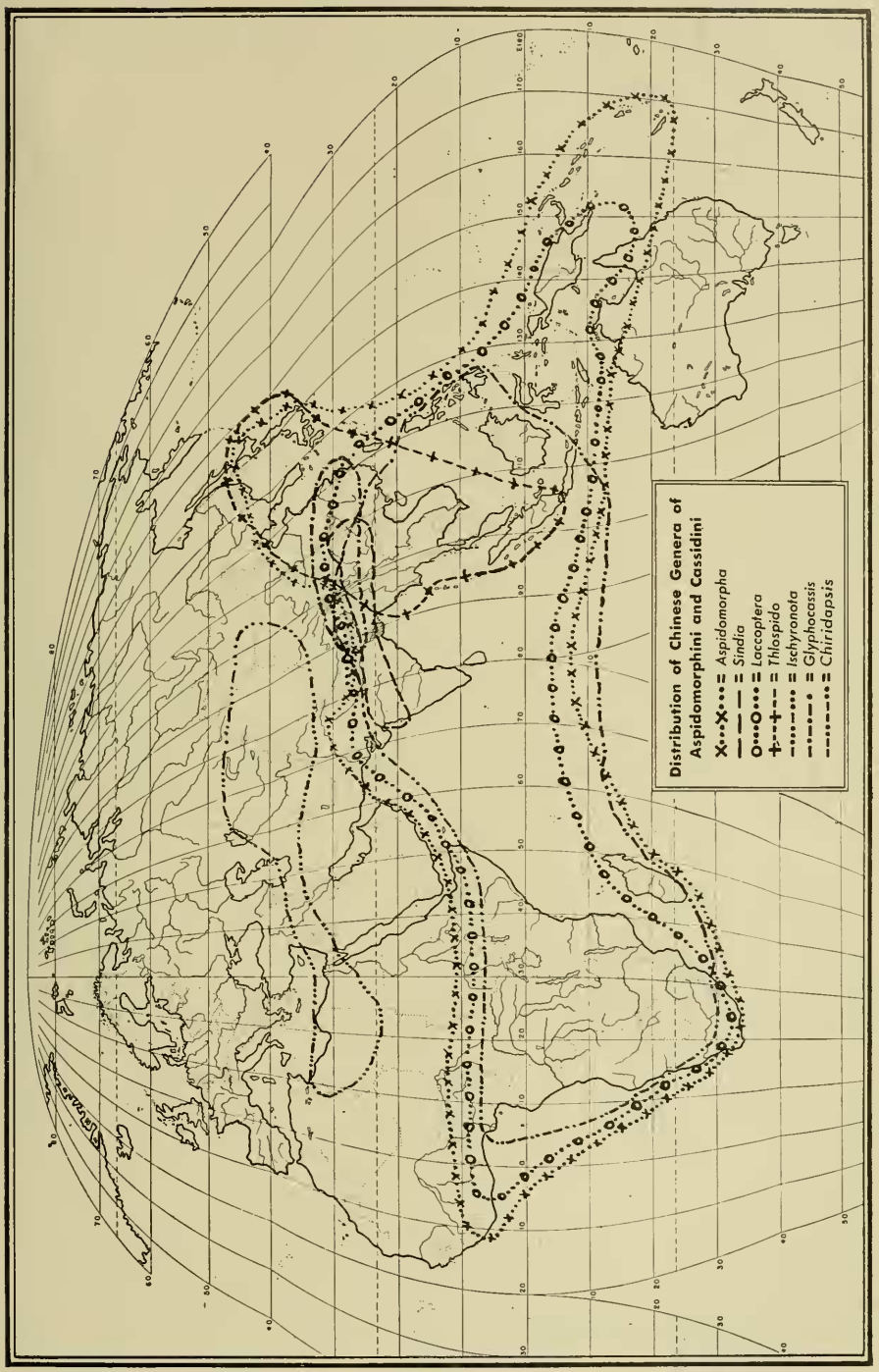
the opposite. An "X" in parentheses indicates that the situation is about half and half.

I consider the above facts as added evidence that the Cassidinae, together with the Hispinae, constitute an ancient group, and that the great differences between their New and Old World constituents are related to

Table VII

World distribution of the subfamilies of Chrysomelidae

Subfamily	Dominantly tropical	Dominantly Old World	Approx. No. Spp.	Genera				Additional Notes
				Approx. No. Gen.	No. Holarc. or Cosmop.	% N. Z and Australia	% Neotropical	
Orsodacninae	—	X	60	5	3	0	(20)	Mostly Holarctic and Asiatic. Few Neotropical species.
Sagrinae	(X)	X	105	16	0	75	12	None Nearctic or Palearctic.
Donaciinae	—	X	120	6	3	33	0	Non-Holarctic genera very small. Few tropical spp.
Criocerinae	X	X	1100	13	2	23	15	Cosmopolitan.
Megascelinae	X	—	125	2	0	0	100	Species entirely Neotropical.
Megalopodinae	X	X	330	14	0	0	36	None Nearctic or European.
Clytrinae	X	(X)	1100	35	2	3	48	Three of the four tribes are Neotropical.
Cryptocephalinae	X	X	2500	50	2	46	4	Cosmopolitan genera large.
Chlamisinae	X	—	400	7	1	0	57	Mostly in cosmopolitan genus *Chlamisus*.
Lamprosominae	X	—	180	4	2	0	100	Species largely Neotropical; few African or Palearctic.
Eumolpinae	X	X	3500	310	5	8	29	Of 26 tribes, 12 entirely Old World, 3 Neotropical.
Chrysomelinae	X	X	2700	130	6	28	18	Two tribes lacking in New World, 4 dominantly Australian.
Galerucinae	X	X	4000	325	7	3	1	Of 7 tribes, 6 dominantly Paleotropical, 1 dom. Palearctic, 1 lacking in New World.
Halticinae	X	X	5000	335	20	6	30	Cosmopolitan.
Hispinae	X	(X)	2000	100	0	5	47	Old and New World tribes entirely separate.
Cassidinae	X	—	3040	157	0	2	69	Of 4 tribes, largest only Neotropical, smallest only Paleotropical.


Distribution of Chinese Genera of Aspidomorphini and Cassidini
X···X··· = Aspidomorpha
— — — = Sindia
O···O··· = Laccoptera
+···+··· = Thlospida
-·-·-·-· = Ischyronota
-·-·-·-· = Glyphocassis
-·-·-·-· = Chiridopsis

Map 2

their host plant preferences combined with their tropical nature and their probably relatively low survival ability under adverse conditions, as suggested in part by their specialization and their scarcity on, or absence from, small islands.

Faunal Analysis of the Chinese Cassidinae

It is well known that China is divided roughly in half between the Palearctic and Oriental regions in the zoogeographical sense. Thus with a tropical group the majority of species are to be found in the southern, or Oriental (zoogeographical sense), portion. The Cassidinae being both dominantly tropical and having a fairly considerable development in the Palearctic region, many species are to be expected in the country, and their occurrence is expected in all, or most, parts of the country. Such proves to be the case. In table VIII the numbers of genera and species of Cassidinae known from various portions of the country and neighboring islands are listed, together with indications of endemism in the areas concerned and figures showing the number of species each of these areas has in common with each other area, as well as certain regions outside the country.

From a study of table VIII it is evident that the entire Palearctic portion of China has far fewer endemic species, both actually and proportionately to the number indigenous. Thus many of the species in North China, as well as Japan, range across Siberia or Central Asia, even to Europe. Over half of the species so far known from North China, Japan, and Central Asia occur also in Europe. The general area of highest endemism, as far as China as a whole is concerned, is the area termed southeast China.

Certain genera, notably the genus *Notosacantha*, the most primitive, have species with apparently rather restricted distribution, while others, such as *Aspidomorpha* and *Cassida*, have many species of wide distribution. On maps 1–3 the known distribution of each of the genera and subgenera known from China is outlined. This illustrates which genera are principally Oriental and which are Palearctic.

The knowledge of Chinese Cassidinae, as well as of most or all other groups of Chinese insects, has not yet reached a very perfect or advanced stage. This is evident from the paucity of records for many species, gaps in distributional plotting and the very small number of subspecific assignments made for the known forms. However, I attempt below, on the basis of this study, correlated with work in other groups of Chinese beetles, as well as a limited familiarity with the distribution of terrestrial vertebrates and plants in China, to establish a basis for a life-zonal arrangement of the country. The following divisions are suggested, being very roughly outlined

TABLE VIII

Statistical analysis of geographical relationships of Chinese *Cassidinae*

Area	Genera		Species			Number of species in common with																
						Oriental									Palearctic							
	Total	Endemic	Total	Endemic	% endemic	Philippines	Malacca, Sunda Is.	India	Indo-China Burma, Thai	Hainan I.	S. China	SE. China	Taiwan (Formosa)	W. China	C. Asia	N. China	Korea	Kyushu	Honshu	Hokkaido	Sachalin	Siberia	Europe
China, Korea & Japan	14	1	92	48	52	5*	10	12*	19	21	51	36	22	28	16	16	10	6	17	6	1	18	9
China	14	1	87	45	51	5	10	12*	19	21	51	36	22	28	16	16	10	6	11	5	1	14	7
Hainan Island	8	0	20	5	25	5*	9	8	14	—	13	13	5	4	0	1	0	3*	2*	0	0	1	0
South China	12	1	51	24	47	4*	8	10*	19	13	—	35	12*	24	3	7	2	6	10	3	1	5	2
SE. China	9	0	36	11	30	4*	7	7	15	13	35	—	11*	12	3	7	3	6	10	3	1	4	1
Taiwan (Formosa)	6	0	22	7	32	1*	2	4	10	5	12*	11*	—	5	4*	7*	4*	4	8*	2*	1*	5	1
West China	10	1	28	12	43	2*	4	7*	8	4	25	12	5	—	1	1	1	3	5*	1	1	3	2
C. Asia	2	0	16	2	13	0	0	0	0	0	3	3	4*	1	—	8	5	1	5	2	1	9	5
North China	5	0	16	0	—	0	0	0	2	1	7	8	7*	1	8	—	8	4	10	5	1	10	2
Korea	3	0	10	0	—	0	0	0	1	0	2	3	4*	1	5	8	—	3	8	5	1	9	1
Japan	3	0	19	1	5	1*	1	1	2	2	5	6	8*	4	5	11	8	—	—	—	1	14	4
Ryukyu Islands	2	0	4	0	—	1*	1	1	2	2	3	3	3	1	1	3	2	2	3	0	0	3	0

* One subspecific relationship is included in these figures.

on map 4, on the basis of the combined ranges of the species characteristic of the zones.

Palearctic Region

Some workers have attempted to divide China into the two zoogeographical regions, Palearctic and Oriental, by drawing a line across the country from east to west, roughly along the route followed by the great Yangtze River, from eastern Tibet, just north of the Himalayas, to the river's mouth. I believe, however, that such a line can only indicate the difference in average majority of Palearctic and Oriental species for the areas thus separated, since the river is not a barrier, at least to very many forms of life. The Palearctic region extends southwestward from eastern China along the mountain ranges of Southeast China parallel to the coast. It also occurs on Taiwan (Formosa) above altitudes of about 1,500 meters in the north and 2,000 meters in the south. It may be divided into the following three zones:

Upper Manchurian Zone: Low altitudes from Harbin northward, including the mountains of North China, Korea, and Japan and the mountains of Taiwan (Formosa) above 2,400 meters in altitude. Also including the lowlands of Hokkaido and Sachalin, and extending as far north in Siberia as most forms of life occur near sea level. The mountains in this northernmost area and the higher mountain tops of North China and Japan must fall in approximately the same category as the Arctic-Alpine fauna of the Nearctic region, since there is rather little in the way of inter-continental barrier for some forms of life in that zone.

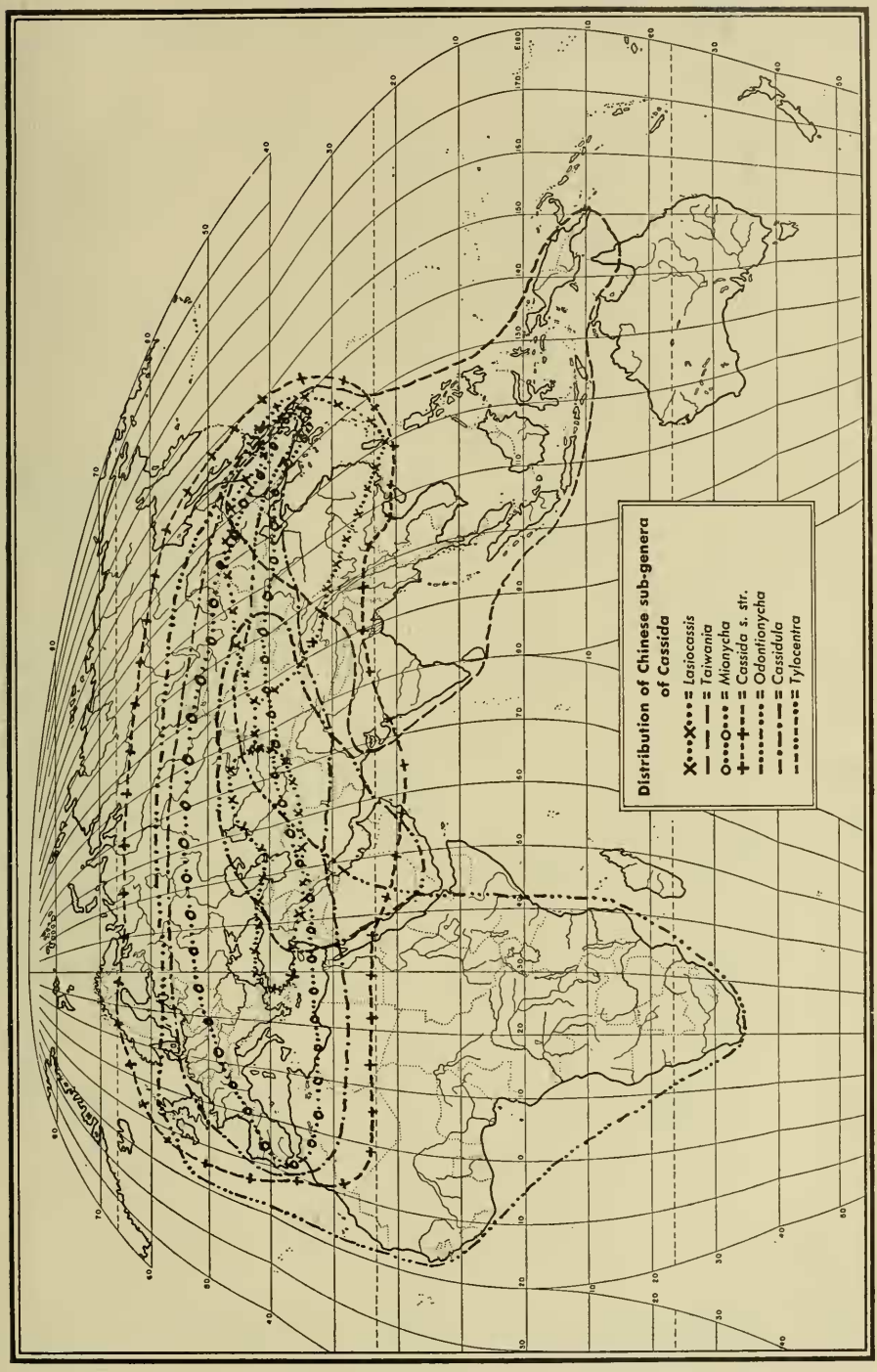
Lower Manchurian Zone: Low altitudes north to Harbin, including Japan; medium altitude areas bordering the Yangtze River and high altitudes in South China (1,000 to 2,000 meters in Southeast China and higher and farther north in West China).

Central Asian Zone: High altitudes in Tibet (exclusive of Sikang); medium to low altitudes, and most of plateau and desert areas, of Mongolia, Tsinghai, and Sinkiang.

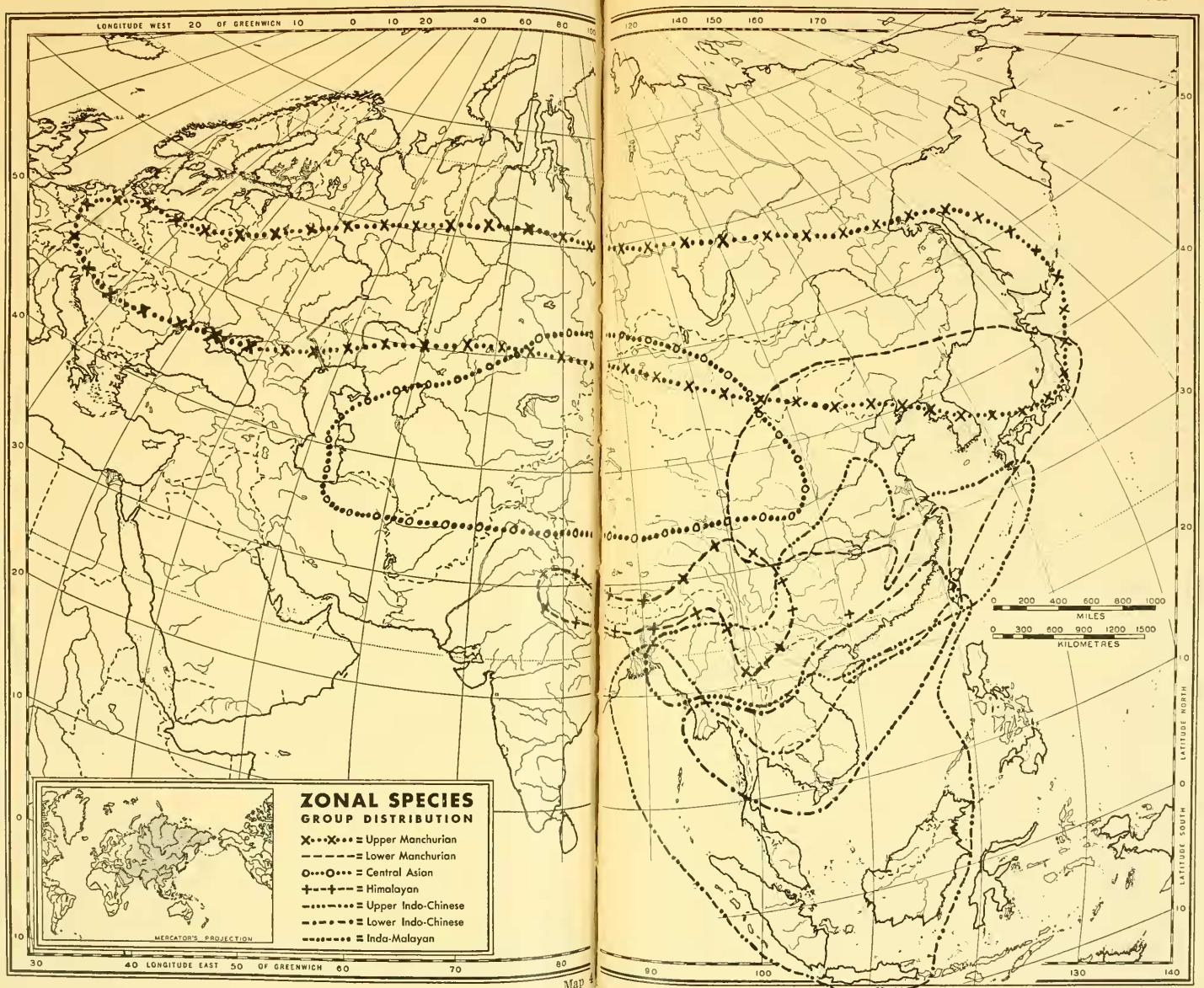
Oriental Region

The Oriental region extends northward in the valleys of Sikang and Szechuan, broadly overlaps the Palearctic in central and eastern China, and is dominant in the Ryukyu Islands, having had some considerable influence in Kyushu and to some extent Shikoku and southern Honshu. It is hardly evident in Korea. It may be divided into the following four zones:

Himalayan Zone: From the southern slopes of the Himalayas eastward into most of Assam, Sikang, and the mountains of Yunnan, Szechuan, and


Distribution of Chinese sub-genera of Cassida
X···X··· = Lasiocassis
| — | — | = Taiwania
O···O··· = Mionycha
+···+···+ = Cassida s. str.
|···|···|···| = Odontionycha
—·—·—·— = Cassidula
—··—··—··— = Tylocentra

Map 3


LONGITUDE WEST 20 OF GREENWICH 10 0 10 20 40 60 80
30 40 LONGITUDE EAST 50 OF GREENWICH 60 70 80
120 140 150 160 170
90 100 130 140
50 40 30 20 10 0 10
LATITUDE NORTH
LATITUDE SOUTH
0 200 400 600 800 1000
MILES
0 300 600 900 1200 1500
KILOMETRES
MERCATOR'S PROJECTION
ZONAL SPECIES
GROUP DISTRIBUTION
X···X··· = Upper Manchurian
– – – – – = Lower Manchurian
O···O··· = Central Asian
+–+– = Himalayan
–··–··– = Upper Indo-Chinese
–·–·–· = Lower Indo-Chinese
–·····– = Inda-Malayan

Map 4

Kweichow. Also restricted occurrence at medium high altitudes in the mountains of Southeast China and Taiwan (Formosa).

Upper Indo-Chinese Zone: The low and medium-high mountains of Burma, Yunnan, Kweichow, southern (lower altitudes) Szechuan, most of the hill country of South China, including the lowlands in southcentral China and the highlands in Kwangtung, Fukien, southern Kwangsi, Indo-China, Thai, and southern Burma. Also the medium-low altitudes (600–1,800 meters) on Taiwan (Formosa), and most altitudes on the Ryukyu Islands. Only the highest mountains on Hainan Island.

Lower Indo-Chinese Zone: The low altitudes in Fukien, Kwangtung, Taiwan (Formosa), and Hainan and much of Indo-China and Thai.

Malayan Zone: Only a slight influence in lowland Hainan, southern lowland Taiwan (Formosa), and southernmost Kwangtung.

PHYLOGENY

The Cassidinae and the Hispinae together (Cryptostomata) apparently had a very early common origin. This may date back to the end of the Paleozoic era. The two subfamilies are still, however, not separated by a very wide gap, except as their biology and larval form is concerned. There are genera in South America, *Himatidium* in particular, which seem more like Cassidinae in their adult form, though their larvae demonstrate that they belong in the Hispinae. In the Oriental region there are genera, such as *Cassidispa* in the Hispinae and *Notosacantha* in the Cassidinae, both existing in China, which appear very similar to each other. Furthermore, species of the genus *Callispa* (Hispinae) also occurring in China, have somewhat expanded, and unspined, lateral margins of the pronotum and elytra, like so many of the primitive genera of the Cassidinae. The larvae of the former, however, are leaf-miners and have no caudal appendages.

The paleontological record is unfortunately not very extensive for the Cassidinae. All the known fossils are European. Most of them belong to the Pliocene period, and all of these probably belong to the genus *Cassida* or its immediate ancestors. There are two older fossils. One of these, called *Cassida aequivoca* Weyenbergh, 1869, from the Jurassic, is a poor specimen and very doubtfully a member of the genus *Cassida*. The other, *Oligocassida melaena* Theobald, 1937, from the Oligocene, is quite different from *Cassida,* and somewhat suggests the Neotropical genus *Deloyala* Chevrolat, though it may be more closely related to some existing African forms. It can hardly be ancestral to *Laccoptera, Aspidomorpha,* and *Thlaspida,* as the author asserts, since a common ancestor of members of the two tribes represented by these three genera would have to be much older than the Oligocene according to my opinion.

As to the phylogenetic relationship of the Chinese genera of Cassidinae, the genus *Notosacantha* is undoubtedly the most primitive. In fact it may well be one of the most primitive tortoise beetle genera of the world, for reasons suggested above. Though many primitive genera now exist in South America, it is not safe to assume, without further evidence, that the group originated in that region. It might have evolved in the Old World and lost more of the primitive types there through extinction. Many of these primitive genera belong to the large, endemic Neotropical tribe, called Tribe II (Spaeth, 1914–c), which may have had common ancestors with the Basiprionotini or branched off after it from the early common line which later gave rise to the ancestors of the Aspidomorphini and Cassidini. In the subtribe Basiprionotini proper, the genera *Megapyga* and *Basiprionota* are possibly to be united as subgenera of one genus.

In the tribe Cassidini there is some question as to whether *Ischyronota, Glyphocassis,* and *Chiridopsis,* the three Chinese genera with antennal grooves on the posternum, had a mutual common origin or whether they had separate derivations. In the genus *Cassida,* the subgenus *Lasiocassis* is thought to have separated from the ancestral stock earlier than the other subgenera, and there is some reason for considering it as a separate genus.

Summary and Conclusions

The subfamily Cassidinae is an ancient group, closely associated with the subfamily Hispinae. Together, these two groups are widely divergent from the remainder of the Chrysomelidae. Both are essentially tropical, are without any true Holarctic distribution, and have no genera in common between the Old and New Worlds. Furthermore, they are scarce in the Nearctic region, where their species are of recent Neotropical derivation. Cassidinae is well represented in Europe, though Hispinae has only two species there.

The Cassidinae have a distribution which is correlated with a restricted range of host plant preference. They are largely limited to certain higher families of sympetalous herbaceous dicotyledons which grow in open country or forest clearings. Thus both hosts and beetles are sun-loving, the latter being very active in the adult stage during sunny weather. The hosts of the European species are largely limited to plant genera of Old World origin. Plant genera in Europe, within the host families, which are considered to be of New World origin are rarely attacked. This, together with further evidence presented above, indicates that the host relationships have long been narrowly limited, and change very slowly. This is considered as partial evidence that the subfamily has a reduced genetic variability and is therefore archaic. Further evidence seems to lie in the fact that the group is lacking on oceanic islands and poorly represented on small continental

islands where less plastic forms are more liable to extermination. Moreover, recent continental islands like the Japanese islands and Taiwan (Formosa) appear to have relatively fewer endemic species than is the case with many other groups of insects, the insular populations seeming in most cases to have failed to differentiate from the continental populations during millions of years of isolation. Still again, the most primitive Chinese genus of Cassidinae, *Notosacantha,* has species with much more restricted range than do the higher genera.

The Cassidinae may have originated either in the Old or New World. In either case the last interchange or migration of forms between the Old and New Worlds no doubt took place during the latest period that tropical conditions prevailed on the continental shelf uniting Asia and North America across the present Bering Sea region, in the Cretaceous or early Eocene at the latest. There is apparently no evidence for any Antarctic communication, with the absence of the Cassidinae from New Zealand, Tasmania, the Pacific Islands, and the temperate Australia. When, in the Tertiary, there was a temperate connection between Asia and North America, the tortoise beetles were evidently prevented from crossing over to North America from Asia. As the fossil record indicates, representatives of the genus *Cassida* must have already existed then in Europe. To explain the lack of dissemination at that time it is hypothecated that the land connection functioned as a filter-bridge closed to the Cassidinae by reasons of their particular host plant preference and sun-loving nature. The flora of the land bridge as far as known consisted of dense redwood forests and secondarily of hardwood forests, all of which may have meant a scarcity or lack of proper host types, conditions too shady for the beetles, or both.

Many of these remarks would appear likewise applicable in explaining the similar situation in regard to the Hispinae, which in the Old World are more particularly tropical than the Cassidinae and are also very restricted in their host relationships, being almost entirely confined to the Gramineae and Palmaceae.

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PLATE 27

Fig. 1. *Notosacantha marginalis* (Gressitt) X 6.7.
Fig. 2. *Notosacantha fumida* (Spaeth) X 6.7.
Fig. 3. *Aspidomorpha dorsata* (Fabricius) X 4.
Fig. 4. *Basiprionota whitei* (Boheman) X 4.
Fig. 5. *Sindiola hospita* (Boheman) X 4.
Fig. 6. *Basiprionota maculipennis reducta* (Gressitt) X 4.
Fig. 7. *Basiprionota chinensis* (Fabricius) X 4.
Fig. 8. *Craspedonta leayana insulana* (Gressitt) X 4.
Fig. 9. *Basiprionota bisignata* (Boheman) X 4.

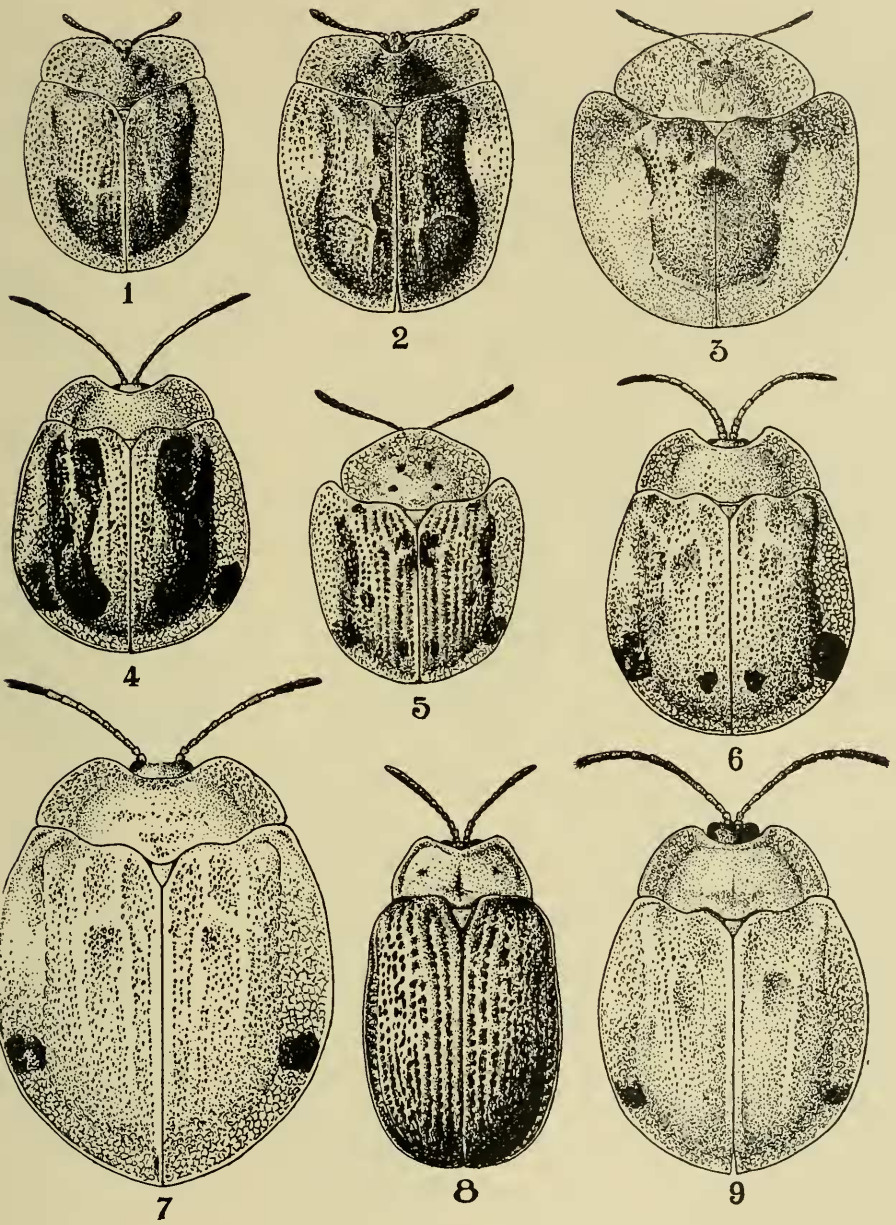
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PLATE 28

Fig. 1. *Aspidomorpha miliaris* (Fabricius) X 4.
Fig. 2. *Cassida (Taiwania) circumdata* Herbst X 7.
Fig. 3. *Aspidomorpha sanctae-crucis* (Fabricius) X 4.
Fig. 4. *Cassida (Taiwania) plausibilis* (Boheman) X 7.
Fig. 5. *Cassida (Taiwania) spaethiana* Gressitt X 7.
Fig. 6. *Cassida (Taiwania) versicolor* (Boheman) X 7.
Fig. 7. *Glyphocassis trilineata szechuana* Gressitt, new subspecies, X 7.
Fig. 8. *Thlaspida lewisi* (Baly) X 7.
Fig. 9. *Thlaspida biramosa chinensis* Spaeth X 7.

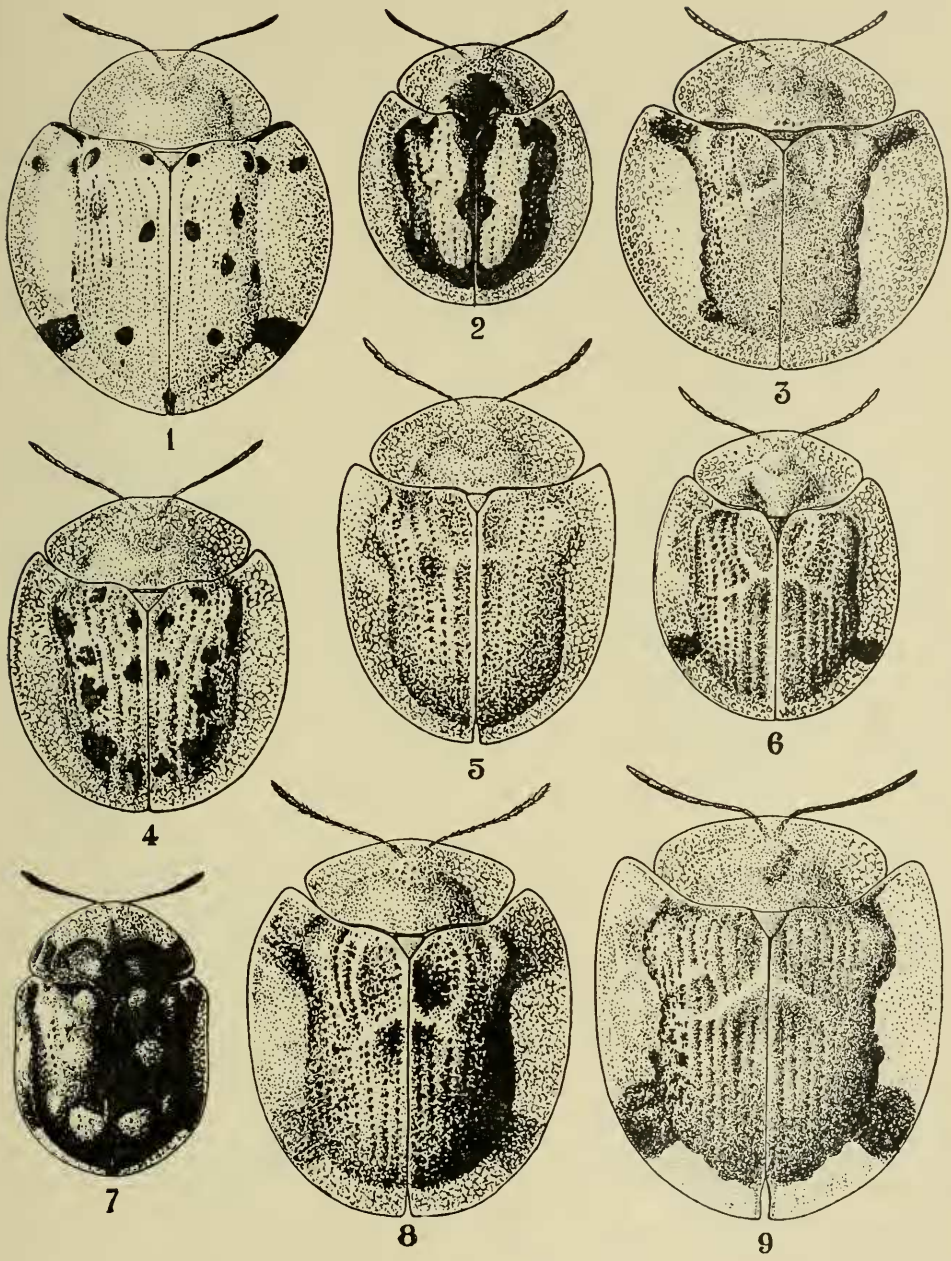
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Fig. 1. *Chiridopsis punctata* (Weber) X 6.
Fig. 2. *Chiridopsis bowringii* (Boheman) X 6.
Fig. 3. *Cassida* (s. str.) *klapperichi* Spaeth X 7.
Fig. 4. *Cassida* (s. str.) *pallidicollis* Boheman X 7.
Fig. 5. *Cassida* (s. str.) *jacobsoni* Spaeth X 7.
Fig. 6. *Cassida* (s. str.) *lineola* Creutzer X 7.
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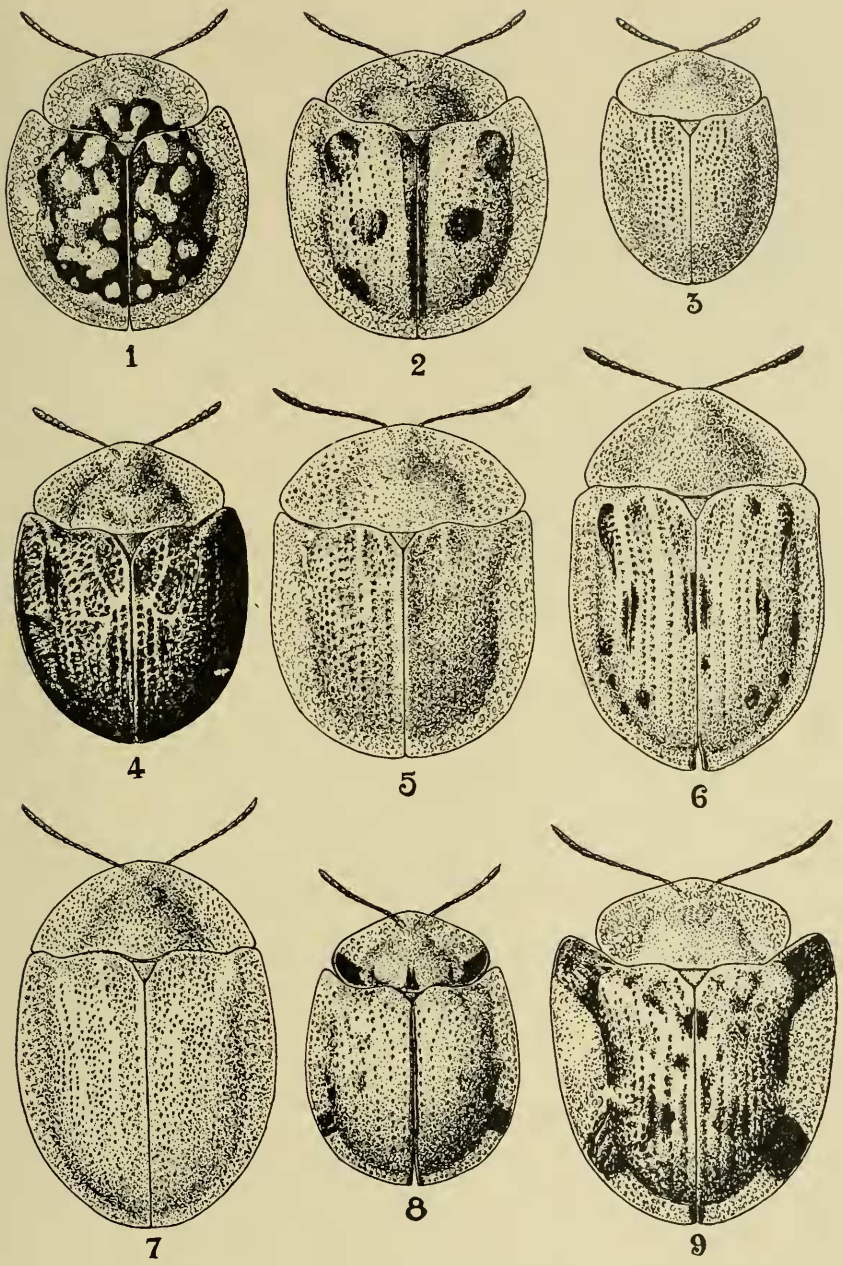
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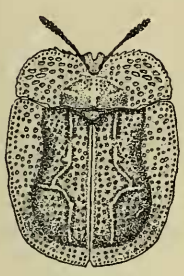
PLATE 30

Fig. 1. *Notosacantha oblongopunctata* (Gressitt) X 6.6.
Fig. 2. *Notosacantha sinica* Gressitt, new species X 6.6.
Fig. 3. *Notosacantha trituberculata* Gressitt, new species X 6.
Fig. 4. *Cassida (Taiwania) discalis* Gressitt X 6.
Fig. 5. *Cassida (Taiwania) imitatrix* Gressitt, new species X 7.
Fig. 6. *Cassida (Taiwania) insulana* Gressitt, new species X 6.
Fig. 7. *Cassida* (s. str.) *laticollis* Gressitt, new species X 5.5.
Fig. 8. *Cassida* (s. str.) *sikanga* Gressitt, new species X 5.4.
Fig. 9. *Cassida (Odontionycha) inflata* Gressitt, new species X 5.5.



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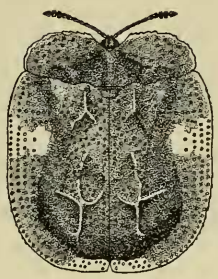

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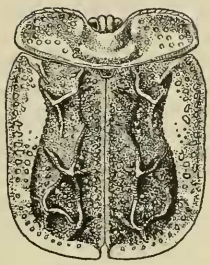

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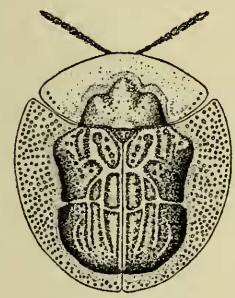

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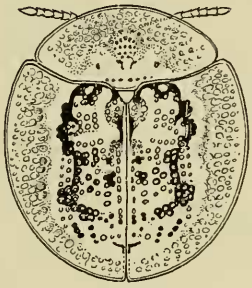

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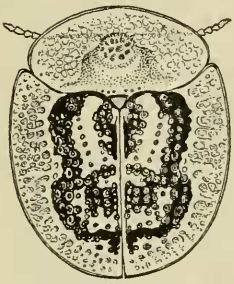

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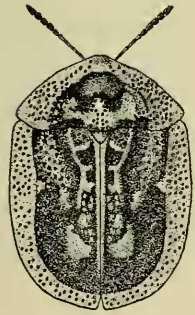

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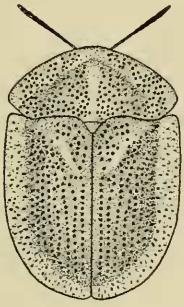

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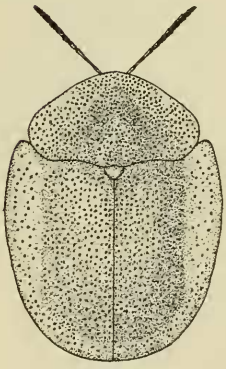

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Plate 31

Aspidomorpha furcata (Thunberg)

Fig. 1. Egg-case opened, showing two eggs above and three below, X 5.8.
Fig. 2. Egg-case, top view, X 5.8.
Fig. 3. First instar larva, caudal process directed backwards, X 5.8.
Fig. 4. Second instar larva, caudal process directed backwards, X 5.8.
Fig. 5. Third instar larva, caudal process in normal position, over body, X 5.8.
Fig. 6. Fourth instar larva, caudal process directed backwards, X 5.8.
Fig. 7. Fifth instar larva, prepupal stage, caudal process in normal position over body, X 5.8.
Fig. 8. Adult of larval parasite, X 5.8.

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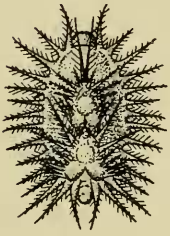

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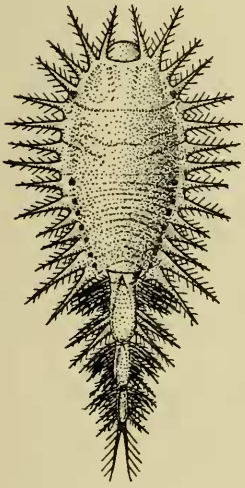

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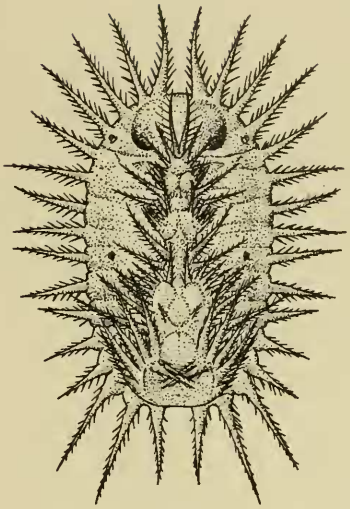

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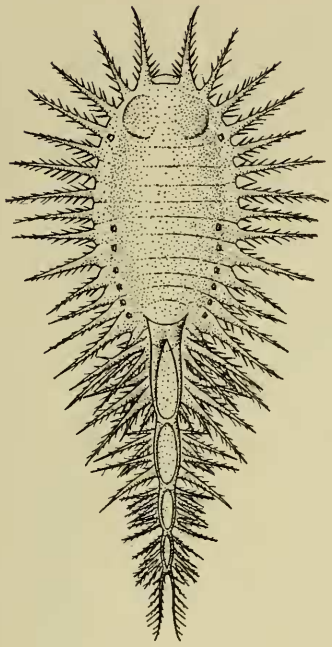
PLATE 32

Aspidomorpha furcata (Thunberg)

Fig. 1. Fifth instar larva, dorsal view, caudal process directed backwards, X 6.7.
Fig. 2. Pupa, dorsal view, X 6.7.
Fig. 3. Pupa, ventral view, X 6.7.
Fig. 4. Adult, dorsal view, X 6.7.



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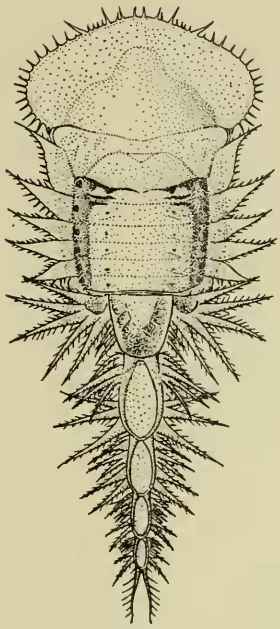

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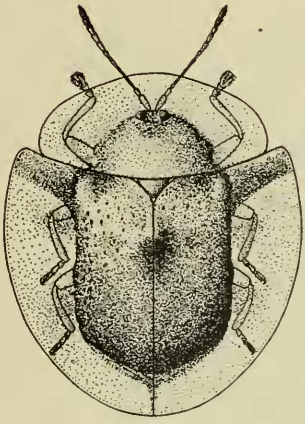

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PLATE 33

Cassida (s. str.) *japana* Baly

Fig. 1. Fifth instar larva, X 10.
Fig. 2. Fourth instar larva, X 10.
Fig. 3. Pupa, ventral view, X 10.
Fig. 4. First instar larva, X 10.
Fig. 5. Ootheca, dorsal view, X 10.
Fig. 6. Ootheca, ventral view, X 10.
Fig. 7. Third instar larva, X 10.
Fig. 8. Second instar larva, X 10.
Fig. 9. Pupa, dorsal view, with feces fork directed backwards, X 10.
Fig. 10. Adult, X 10.

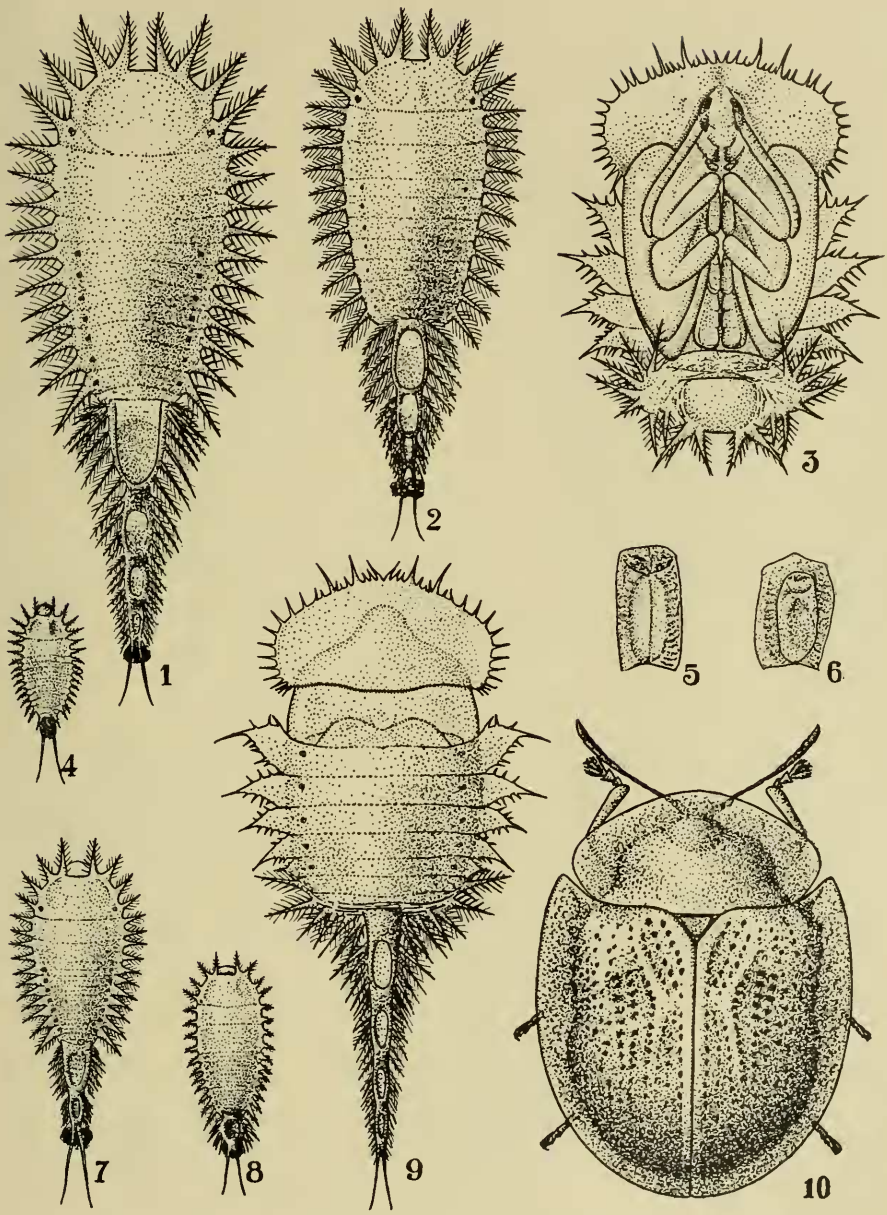
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PLATE 34

Cassida (Taiwania) obtusata Boheman

Fig. 1. Ootheca, dorsal view, X 12.
Fig. 2. First instar larva, X 12.
Fig. 3. Fifth instar larva, X 12.
Fig. 4. Third instar larva, X 12.
Fig. 5. Pupa, dorsal view, with feces fork directed backwards, X 12.
Fig. 6. Second instar larva, X 12.
Fig. 7. Pupa, ventral view, X 12.
Fig. 8. Adult, X 12.
Fig. 9. Fourth instar larva, X 12.

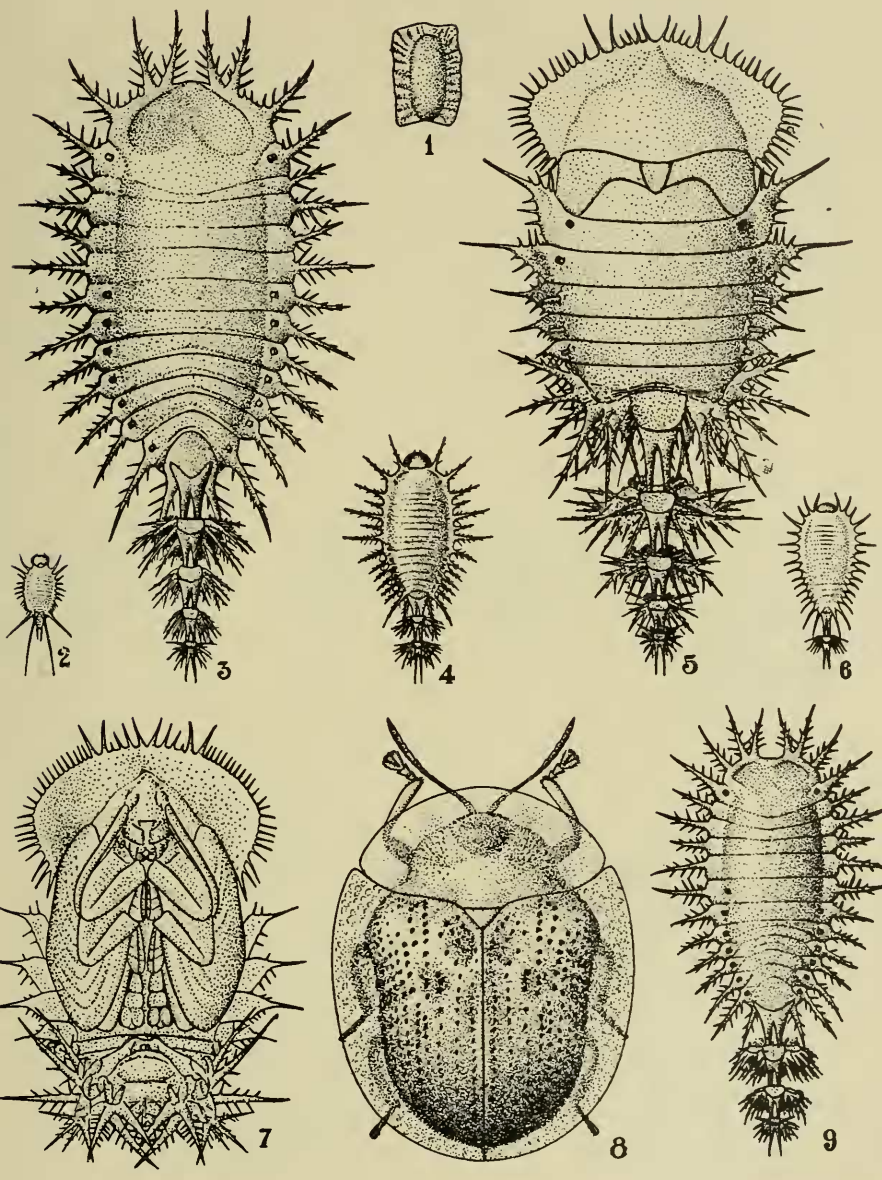
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PLATE 35

Laccoptera quadrimaculata (Thunberg)

Fig. 1. First instar larva, X 6.
Fig. 2. Fifth instar larva, X 6.
Fig. 3. Egg, removed from ootheca, X 6.
Fig. 4. Pupa, ventral view, X 6.
Fig. 5. Ootheca, with feces removed, dorsal view, X 6.
Fig. 6. Ootheca, with feces in place, dorsal view, X 6.
Fig. 7. Second instar larva, X 6.
Fig. 8. Fourth instar larva, X 6.
Fig. 9. Adult, X 6.
Fig. 10. Pupa, dorsal view, X 6.

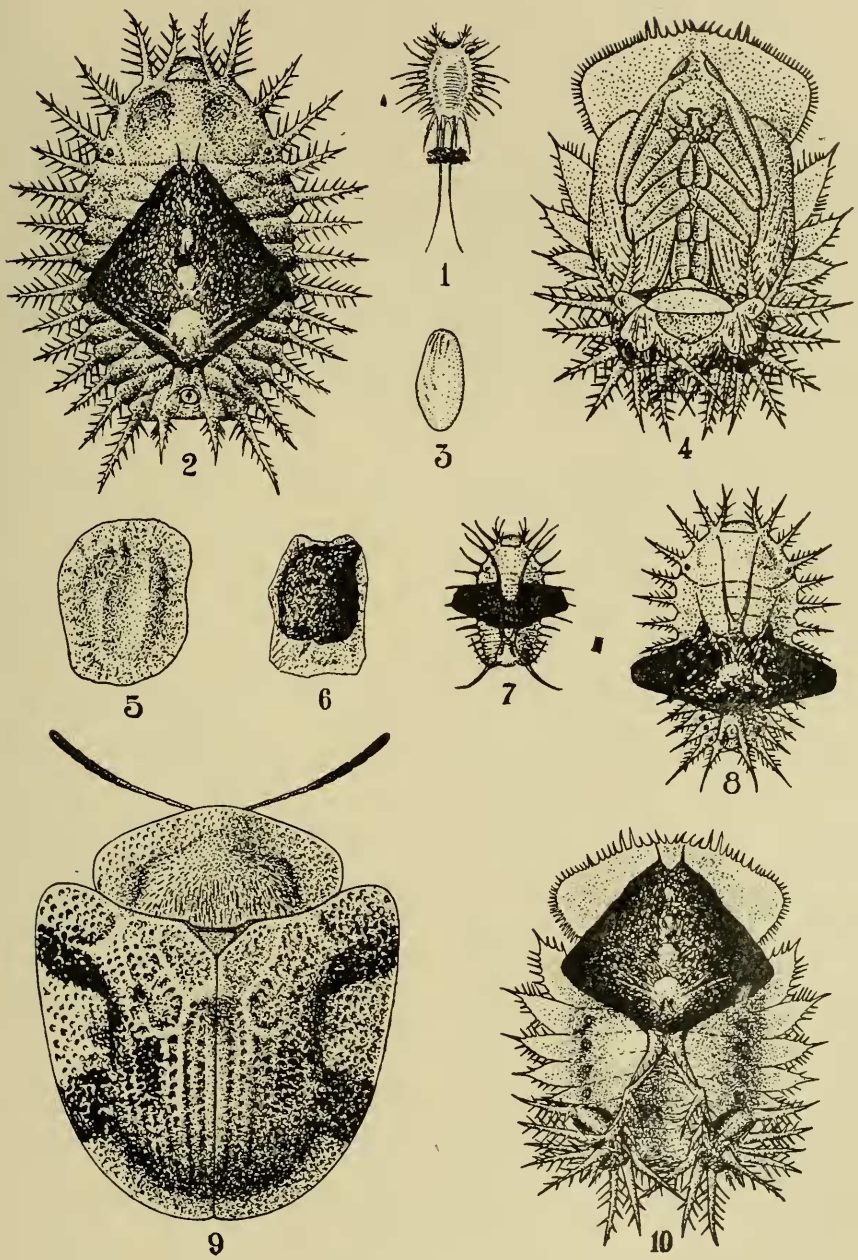
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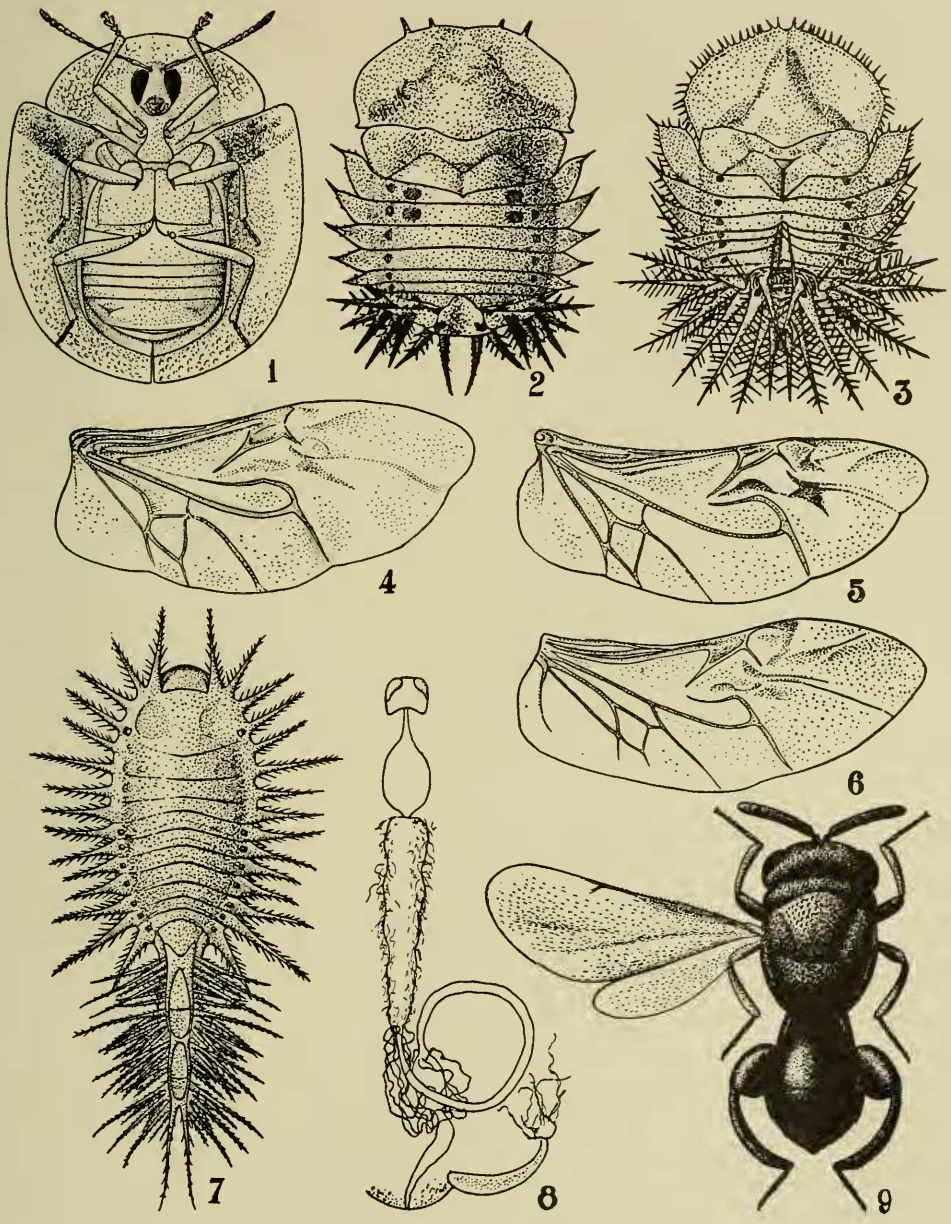
Plate 36

Fig. 1. *Aspidomorpha furcata* (Thunberg), ventral view of adult, X 6.
Fig. 2. *Aspidomorpha miliaris* (Fabricius), dorsal view of pupa, X 4.
Fig. 3. *Aspidomorpha sanctae-crucis* (Fabricius), dorsal view of pupa, X 4.
Fig. 4. *Aspidomorpha furcata* (Thunberg), right wing, X 8.
Fig. 5. *Laccoptera quadrimaculata* (Thunberg), right wing, X 7.
Fig. 6. *Cassida (Taiwania) circumdata* Herbst, right wing, X 10.
Fig. 7. *Aspidomorpha furcata* (Thunberg), third instar larva with feces fork turned back, dorsal view, X 10.
Fig. 8. *Laccoptera quadrimaculata* (Thunberg), alimentary canal of adult, X 10,
Fig. 9. Adult of parasite of larva of *Cassida (Taiwania) circumdata* Herbst, X 14.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